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Additions to the Palæobotany of the Cretaceous Formation on Long Island.

[PLATES 174–180.]

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In previous contributions* may be found descriptions and figures of ten species of cretaceous leaves from the north shore of Long Island. Since these contributions were prepared, considerable new material has been added from several sources, besides which, all the material previously collected but not described has been subjected to careful examination. The results obtained it is the object of this paper to present.

For part of the new material I am indebted to the courtesy of the Long Island Historical Society, in whose collection are several valuable specimens, which I was allowed every possible facility to study. Another series of specimens was collected by Mr. Gilbert Van Ingen, curator in the geological department of Columbia College, and the remainder was personally collected in connection with the summer school of geology of Columbia College. All the specimens, with the exception of those belong-

* i. "Preliminary Contribution to Our Knowledge of the Cretaceous Formation on Long Island and Eastward." Trans. N. Y. Acad. Sci. 12: 222–237, *pl. 5–7* (1893).

ii. "A New Fossil Palm from the Cretaceous Formation at Glen Cove, Long Island." Bull. Torr. Bot. Club, 20: 168, 169, *pl. 149* (1893).

iii. "Some Further Notes upon *Serenopsis Kempii*." Bull. Torr. Bot. Club, 20: 334, 335, *pl. 166* (1893).

ing to the Long Island Historical Society, are now in the geological museum of Columbia College.

It will not be necessary, in this contribution, to discuss any of the geological problems connected with these plant remains; this has already been done in part* and may be found further considered in a paper read before the New York Academy of Sciences, January 22, 1893, and now in course of publication in the Transactions.

It is sufficient here to say that the specimens personally collected were found on Eaton's Neck, Lloyd's Neck, Oak Neck, and in the vicinity of Glen Cove. Mr. Gilbert Van Ingen's collection was made at Sea Cliff, and the specimens belonging to the Long Island Historical Society were found in Brooklyn. The following fifty-one descriptions include forty-six additions to the previously recognized cretaceous flora of Long Island, nine of which are new species.

In many instances I have been able to identify the Long Island species with unpublished descriptions and figures by Dr. J. S. Newberry, representing the Amboy clay flora of New Jersey. Where such has been the case I have retained Dr. Newberry's manuscript names.

Descriptions of Species.

SALIX PROTEÆFOLIA FLEXUOSA Lesq. (Pl. 174. f. 5.)

Salix proteæfolia var. *flexuosa* Lesq. Fl. Dak. Gr. 50, *pl. 64, f. 4, 5.*

Amongst the numerous specimens of *Salix* from the Amboy clays are several identified by Newberry as *S. proteæfolia* Lesq. They vary considerably in size and it is probable that some of them may be referable to this variety.

Locality: Sea Cliff.

SALIX PURPUROIDES n. sp. (Pl. 174, f. 9.)

Leaf small (1⅛ in. long, $\frac{3}{16}$–¼ in. wide); narrowly lanceolate; tapering gradually to the acute base and somewhat abruptly to the bluntish apex; entire; midrib rather prominent; secondaries thin, numerous, irregularly disposed, leaving the midrib at an acute angle, slightly curved and extending upward along the margin.

* *loc. cit.* 222–234.

This little leaf resembles quite closely those of the living *S. purpurea* L., as I have indicated in the specific name.

Locality: Sea Cliff.

JUGLANS CRASSIPES Heer. (Pl. 175, f. 3.)

Juglans crassipes Heer, Fl. Moletein, 23, *pl. 6, f. 3.*

Also identified from the cretaceous of Kansas by Lesquereux* and by Heer from Greenland.† So far as I am aware it has not been previously reported from the eastern United States.

Locality: Brooklyn, *fide* specimen in the cabinet of the Long Island Historical Society, "De Kalb Avenue, near Reid Street. G. Hurst, No. 233."

JUGLANS ARCTICA Heer. (?) (Pl. 178, f. 2.)

Juglans arctica Heer, Fl. Foss. Arct. **6**: 71, *pl. 40, f. 2; 41, f. 4c; 42, f. 1–3; 43, f. 3.*

It is always hazardous to identify a species from such a fragment as ours, and I have only placed it provisionally under the above name. Some of Heer's figures represent specimens scarcely less fragmentary, however, and the comparison does not seem unwarranted. It has also been collected at Woodbridge, N. J., and is reported from the cretaceous of Kansas by Lesquereux.‡

Locality: Glen Cove.

FICUS PROTOGÆA Heer (?) (Pl. 175, f. 4).

Ficus protogæa Heer, Fl. Foss. Arct. **3**: 108, *pl. 29, f. 2b; 30, f. 1–8.*

Although both base and apex are missing from our specimen, its provisional reference to the above species seems reasonable, especially as fruit, referred to the same species, has been found in the cretaceous of Kansas.§ It has not been elsewhere reported, however, from the United States.

Locality: Glen Cove.

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* Fl. Dak. Gr. 69, *pl. 49, f. 1–3.*

† Fl. Foss. Arct. **7**: **27**, *pl. 61, f. 4; 65, f. 9.*

‡ Fl. Dak. Gr. 68, *pl. 19, f. 3; 39, f. 5.*

§ Fl. Dak. Gr. 85, *pl. 10, f. 7, 8.*

FICUS WILLISIANA n. sp. (Pl. 176, f. 2, 5).

Leaf large, apparently about 7 in. long by 4 in. wide at broadest part, tapering to the acute apex; margin entire; midrib and secondaries rather slender for the size of the leaf, the latter conspicuously curved upward and comptodrome.

A full description of this leaf is impossible from the material now in our possession, but it is evidently such a distinctive species that the portions figured will serve to identify it in case more perfect specimens should be found in the future.

Named for Mr. Bailey Willis, of the U. S. Geological Survey, and one of the earliest collectors of cretaceous specimens in the vicinity of Glen Cove.

Locality: f. 2, Glen Cove; f. 5, Sea Cliff.

PROTÆOIDES DAPHNOGENOIDES Heer. (Pl. 177. f. 1.)

Protæoides daphnogenoides Heer, Phyl. Cret. Neb. 17, *pl. 4. f. 9, 10.*

This is one of the commonest species in the Amboy clays; it has been previously reported by me from Staten Island,* and by Lesquereux from the cretaceous of the West.†

Locality: Sea Cliff.

LAURUS OMALII Sap. et Mar. (Pl. 176, f. 3, 6.)

Laurus Omalii Sap. et Mar. Essai Veg. Marnes Heers. Gelind. 49, *pl. 6, f. 1.*

The reference of this species to the genus *Laurus* appears to me questionable, but as our specimens are apparently identical with the above it is proper that they should be identified with that name. It has not as yet been reported from elsewhere in America.

Locality: f. 3, Sea Cliff; f. 6, Glen Cove.

LAURUS NEWBERRYANA n. sp. (Pl. 179, f. 5.)

Leaf lanceolate, 4 in. long, 1⅜ in. wide in middle, entire; lower secondaries leaving the midrib at an acute angle, upper ones at a more obtuse angle.

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*"The Palæontology of the Cretaceous Formation on Staten Island." Trans. N. Y. Acad. Sci. **11**: 98, *pl. 3, f. 1, 2* (1892); "Additions to the Palæobotany of the Cretaceous Formation on Staten Island." Trans. N. Y. Acad. Sci. **12**: ,36 *pl. 2, f. 4, 9, 13* (1892).

† Cret. Fl. 85, *pl. 15, f. 1, 2.*

It resembles somewhat the leaf described under the name *Laurus Knowltoni* Lesq.,* but is not as long, nor is it as tapering to the apex, and the secondaries are weaker. Named for Professor J. S. Newberry.

Locality: Glen Cove.

SASSAFRAS PROGENITOR Newb. mss. (?) (Pl. 174, f. 1.)

This fragmentary leaf is apparently comparable with the species described under the above name from the Amboy clays by Newberry, and I have thought it best to so refer it, provisionally.

Locality: Oak Neck.

CINNAMOMUM SEZANNENSE Wat. (Pl. 180, f. 5, 7.)

Cinnamomum Sezannense Wat. Pl. Foss. Bass. Paris, 175, *pl. 50, f. 2.*

These leaves are so close to those described as above that I can but consider them identical. Specimens figured by Saporta and Marion† from Gelinden and by Heer‡ from Greenland are even more nearly like ours, and their identity is far more marked than it is between them and the specimens figured by Lesquereux§ from Kansas, which latter more nearly resemble certain forms found in the Amboy clays, described by Newberry under the name *C. intermedium*, n. sp.

Locality: f. 5, Glen Cove; f. 7, Sea Cliff.

DIOSPYROS ROTUNDIFOLIA Lesq. (Pl. 179, f. 2).

Diospyros rotundifolia Lesq. Cret. Fl. 89, *pl. 30, f. 1, 1a.*

This is an exceedingly variable species, if we are to include all the specimens which have been identified with it, and while our specimen cannot be compared with the figures of the type, as above quoted, yet Lesquereux's subsequent figures‖ compare quite satisfactorily with ours.

Locality: Glen Cove.

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*Fl. Dak. Gr. 94, *pl. 50, f. 4.*

†Rev. Fl. Heers. Gelind. 60, *pl. 9, f. 2–6.*

‡Fl. Foss. Arct. **6**: 77, *pl. 19, f. 8*; *33, f. 11, 12*, and **7**: 30, *pl. 61, f. 1a.*

§Fl. Dak. Gr. 107, *pl. 12, f. 6, 7.*

‖Fl. Dak. Gr. 112, *pl. 17, f. 8–11.*

MYRSINE ELONGATA Newb. mss. (Pl. 177, f. 2).

This leaf is evidently identical with those described by Newberry under the above name, from the Amboy clays.

Locality: Lloyd's Neck.

ANDROMEDA PARLATORII Heer. (Pl. 175, f. 2, 5.)

Andromeda Parlatorii Heer, Phyl. Crét. Neb. 18, *pl. 1, f. 5.*

This species, originally described from the cretaceous of Nebraska by Heer, was subsequently found in the West by Lesquereux,* in more or less abundance; by Heer† in Greenland; by David White on Martha's Vineyard,‡ and it is one of the commonest species in the Amboy clays.

Locality: Sea Cliff.

VIBURNUM INTEGRIFOLIUM Newb. mss. (Pl. 177, f. 7.)

This fragment is evidently identical with the specimen described by Newberry under the above name from the Amboy clays. Its reference to *Viburnum* seems more than doubtful, but as it will be eventually published under the above name I have thought it best to retain it in full.

Locality: Glen Cove.

ARALIA TRANSVERSINERVIA Sap. et Mar. (Pl. 176, f. 1.)

Aralia transversinervia Sap. et Mar. Rev. Fl. Heers. Gelind. 79, *pl. 12, f. 4; 14, f. 1.*

I doubt very much whether this leaf ought to be included in the genus *Aralia;* it is more likely to be a *Ficus*, but it is evidently identical with the species described and figured as above.

Locality: Oak Neck.

ARALIA PATENS Newb. mss.(?) (Pl. 174, f. 4.)

This fragment apparently belongs to an *Aralia*, with widely spreading divergent lobes, similar to the species described under the above name by Newberry from the Amboy clays.

Locality: Glen Cove.

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* Cret. Fl. 88, *pl. 23, f. 6, 7; 28, f. 15;* Fl. Dak. Gr. 115, *pl. 19, f. 1; 52, f. 6.*

† Fl. Foss. Arct. 3: 112, *pl. 32, f. 1, 2;* and 6: 79, *pl. 21, f. 1b, 11; 42, f. 4c.*

‡ "On Cretaceous Plants from Martha's Vineyard." Am. Journ. Sci. (III.) 39: 97, *pl. 2, f. 4* (1890).

ARALIA NASSAUENSIS n. sp. (Pl. 174, f. 3, 7.)

Leaves palmately three-lobed, decurrent at base; lobes broad, obscurely and irregularly dentate, pointed; nervation strong, craspedodrome where terminating in the teeth, otherwise camptodrome along the margin; secondaries irregular in location and direction; tertiary nervation and areolation reticulate, forming irregular polygonal meshes.

These two beautifully preserved fragments represent a leaf apparently allied to *A. Looziana* Sap. et Mar.,* and *A. Wellingtoniana* Lesq.,† which latter has also been found in the Amboy clays. It is clearly, however, neither of these, and Prof. Lester F. Ward, to whom I submitted the drawings for comparison, considers it a new species, identical with specimens of his own collecting, from the vicinity of Washington, D. C., in the new Pennsylvania Avenue extension.

Named for Nassau, the old name for Long Island.

Locality: Brooklyn, *fide* specimens in the cabinet of the Long Island Historical Society. f. 3, "Throop Avenue and Kosciusko Street, 12 ft. below surface, W. Miles; f. 7, "Brevoort Pl. 6, ft. below surface, J. C. Brevoort."

MYRTOPHYLLUM (EUCALYPTUS?) GEINITZI Heer. (Pl. 177, f. 11.)

Myrtophyllum Geinitzi Heer, Fl. Foss. Arct. **3**: 116, *pl. 32, f. 14–17; 33, f. 6b;* and **6**: 93, *pl. 19, f. 1c; 45, f. 4–9; 46, f. 12c, d, 13.*

This species is apparently one of the most abundant in the cretaceous of the East. It was previously reported by me from Long Island,‡ and from two localities on Staten Island;§ it is abundant, at three different localities in the Amboy clays, and is one of the species mentioned by White as occurring on Martha's Vineyard.‖ It is also described by Heer from Moletein,¶ and by Lesquereux from the West.**

Locality: Glen Cove.

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*Rev. Fl. Heers. Gelind. 77, *pl. 13, f. 1–3.*

†Fl. Dak. Gr. 131, *pl. 21, f. 1; 22, f. 2, 3.*

‡ Trans. N. Y. Acad. Sci. **12**: 236, *pl. 6, f. 2* (1893).

§ Trans. N. Y. Acad. Sci. **11**: 98, *pl. 2, f. 1* (1892); and **12**: 34, *pl. 2, f. 5* (1892).

‖ Am. Journ. Sci. (III.) **39**: 98, *pl. 2, f. 8-11* (1890).

¶ Kreide Fl. Moletein, **22**, *pl. 11, f. 3, 4.*

** Fl. Dak. Gr. 138, *pl. 37, f. 20.*

EUCALYPTUS? NERVOSA Newb. mss. (?) (Pl. 174, f. 10.)

This fragment apparently represents an almost linear leaf, similar to such as have been described under the above name by Newberry from the Amboy clays. Or it may be a portion of *E. Dakotensis* Lesq. (Fl. Dak. Gr. 137, *pl. 37, f. 14–19*). Its reference to the species which is described from the East would seem, however, to be the most likely.

Locality: Sea Cliff.

HYMENÆA DAKOTANA Lesq. (?) (Pl. 176, f. 4).

Hymenæa Dakotana Lesq. Fl. Dak. Gr. 145, *pl. 55, f.2, 3; 56, f. 1. 2; 62, f. 2.*

Our specimen, although somewhat larger, agrees quite closely with the species as above described, and I have so referred it provisionally.

Locality: Sea Cliff.

COLUTEA PRIMORDIALIS Herr. (Pl. 174 f. 2.)

Colutea primordialis Heer, Fl. Foss. Arct. 6: 99, *pl. 27, f. 7–11; 43, f. 7, 8.*

Ours is apparently a large specimen of this species, agreeing quite closely with the specimen figured by Heer, *loc. cit. pl. 27, f. 11.* This was the only well defined leaf found on Eaton's Neck, and is practically our only voucher for the existence of the cretaceous formation at that locality. It has been found in the Amboy clays at Woodbridge and in the cretaceous of the West.*

Locality: Eaton's Neck.

LEGUMINOSITES CONVOLUTUS Lesq. (?) (Pl. 177, f. 14.)

Leguminosites convolutus Lesq. Fl. Dak. Gr. 151, *pl. 44, f. 4.*

This fragment is manifestly too small to form the basis for a new species, and if referred provisionally to any described species, the above would seem to be its proper place.

Locality: Glen Cove.

LEGUMINOSITES CONSTRICTUS Lesq. (?) (Pl. 177, f. 13.)

Leguminosites constrictus Lesq. Fl. Dak. Gr. 151, *pl. 44, f. 3.*

It is unfortunate that the apex of our specimen is missing, but

* Fl. Dak. Gr. 148, *pl. 13, f. 8, 9.*

the general appearance seems sufficiently close to warrant its provisional reference to the above species.

Locality: Oak Neck.

SAPINDUS MORRISONI Lesq. (Pl. 179, f. 8.)

Sapindus Morrisoni Lesq. Cret. and Tert. Fl. 83, *pl. 16, f. 1, 2.*

If all the specimens which have been referred to this species have been correctly identified it is one of the most widely distributed species in America. It has not been found in the Amboy clays, but it has been previously reported by me from Long Island * and Staten Island;† by White from Martha's Vineyard;‡ by Heer from Greenland;§ as well as from its place of original discovery in the West.

Locality: Glen Cove.

CISSITES FORMOSUS Heer.(?) (Pl. 174, f. 6.)

Cissites formosus Heer, Fl. Foss. Arct. **6**: 85, *pl. 21, f. 5–8.*

This fragment is too imperfect for anything more than provisional determination, and it is placed under the above name with some misgivings. The species has been found in considerable numbers, however, in the Amboy clays, and is reported from the cretaceous of Kansas by Lesquereux.‖

Locality: Dosoris Island, Glen Cove.

PALIURUS INTEGRIFOLIUS n. sp. (Pl. 177, f. 5, 8, 12.)

Leaves variable in size, (1 in.–3 in. long, ¾ in.–2½ in. wide,) rounded at the base, entire; nervation palmate, symmetrical; midrib and lateral primaries about equally strong, only slightly divergent; secondaries from the lateral primaries strong, ascending at an acute angle, the lowest ones curved, the upper almost straight and apparently loosing themselves in the parenchyma of the blade.

It is with some hesitation that I have included these three specimens under one species. They may each represent a distinct species, but as only the bases of each are preserved, I have thought it best to group them together provisionally, in the hope

* Trans. N. Y. Acad. Sci. **12**: 235, *pl. 6, f. 3* (1893).

† Trans. N. Y. Acad. Sci. **11**: *pl. 3, f. 5* (1892).

‡ Am. Journ. Sci. (III.) **39**: 99, *pl. 2, f. 12* (1890).

§ Fl. Foss. Arct. **6**: 96, *pl. 40, f. 1; 41, f. 3; 43, f. 1a, b; 44, f. 7, 8.*

‖ Fl. Dak. Gr. 161, *pl. 21, f. 5.*

that more complete material may be collected in the future, when we may be able to differentiate them.

Locality: f. 5, Lloyd's Neck; f. 8, Glen Cove; f. 12, Oak Neck.

ZIZYPHUS ELEGANS n. sp. (Pl. 177, f. 9, 10.)

Leaves ovate, varying in size, (about 1 in. long, $\frac{11}{16}$ in. or less wide), entire, symmetrical; nervation palmate; midrib slender, sparingly branched above; lateral primaries more slender, curving strongly from the base upward, branched on the outside, branches curving upward, all apparently eventually loosing themselves in the parenchyma of the blade.

Numerous fragments of these beautiful little leaves were found, which I have been unable to refer to any described species.

Locality: Glen Cove.

ZIZYPHUS LEWISIANA n. sp. (Pl. 180, f. 13.)

Leaf narrowly lanceolate-falcate, entire; about $1\frac{3}{4}$ in. long, including the short petiole, $\frac{3}{8}$ in. wide at about the middle; tapering to the apex and rounding to the base; nervation palmate; midrib slender but prominent; lateral primaries thin, connected with the secondaries from the midrib and forming a series of loops along the margin at a distance of about $\frac{1}{16}$ in. from it.

Named for Mr. Elias Lewis, Jr., to whom we are indebted for much careful work in the geology of Long Island.

Locality: Oak Neck.

RHAMNUS (?) ACUTA Heer. (Pl. 177, f. 6.)

Rhamnus(?) *acuta* Heer. Fl. Foss. Arct. **6**: 98, *pl. 41, f. 6;* and *45, f. 13c.*

This specimen is apparently identical with the species described as above by Heer, from Greenland. I do not know that it has been elsewhere reported from America.

Locality: Lloyd's Neck.

CELASTROPHYLLUM BENEDENI Sap. et Mar. (Pl. 177, f. 3, 4.)

Celastrophyllum Benedeni Sap. et Mar. Essai. Veg. Marnes Heers. Gelind. 67, *pl. 10, f. 6;* and *12, f. 1, 2.*

This specimen has been compared with several species of *Celastrophyllum* from the Amboy clays and elsewhere, but its identity with the above seems to be beyond question, and if so, this is its first reported occurrence in America.

Locality: Glen Cove.

CELASTROPHYLLUM DECURRENS Lesq. (?) (Pl. 179, f. 1.)

Celastrophyllum decurrens Lesq. Fl. Dak. Gr. 172, *pl. 36, f. 1.*

I am inclined to think that this is an imperfectly preserved specimen of the above species in which the fine serrations and narrow decurrent petiole are not apparent; or it may represent the species described by me from Staten Island under the name *Myrica grandifolia.* (Trans. N. Y. Acad. Sci. 12: 32, *pl. 3, f. 1.* (1892).) A specimen with more perfectly preserved margin could alone determine these points.

Locality: Glen Cove.

GREWIOPSIS VIBURNIFOLIA Ward. (Pl. 174, f. 8.)

Grewiopsis viburnifolia Ward, Bull. 37, U. S. G. S. 89, *pl. 40, f. 2.*

This appears to be without doubt a small specimen of the above species, described by Ward from the Laramie of Montana. It also has the appearance, were it not for the small size, of certain species of *Platanus*, (*P. Newberryana* Heer, Fl. Foss. Arct. 7: *pl. 59, f. 6*), from the Patoot beds of Greenland. It might also be compared with *Viburnum*, as indicated by Ward in his discussion of the type. It is the only specimen of its kind which I have yet seen from the eastern United States.

Locality: Lloyd's Neck.

MENISPERMITES BRYSONIANA n. sp. (Pl. 180, f. 10.)

Leaf inequilateral, entire, broadly cordate at base, widest at about one-third the distance from base to tip, thence rapidly narrowing; dimensions about $3\frac{1}{2}$ in. long by $1\frac{3}{4}$ in. wide at broadest part, one side only slightly curved, the other conspicuously so; nervation consisting of a midrib, which is nearest to the side with least curve, a strong lateral nerve, which originates at a distance of about $\frac{3}{16}$ in. from the base and curves towards the outer side, and several secondaries, which also spring at irregular intervals from the midrib.

It has much the general appearance in outline of the fragment of *M. borealis* Heer, described and figured in Fl. Foss. Arct. 6: 91, *pl. 39, f. 2*, from the lower Atane beds of Greenland, and with similar leaves from the Amboy clays of New Jersey. Our specimen, however, is smaller than any of these, and apparantly has but a single strong lateral nerve, whereas all the others mentioned have two or more.

Named for Mr. John Bryson, who has performed valuable service in the study and interpretation of geological phenomena on Long Island.

Locality: Glen Cove.

MAGNOLIA SPECIOSA Heer. (Pl. 178, f. 5.)

Magnolia speciosa Heer, Kreide Fl. Moletein, 20, *pl. 6, f. 1; 9, f. 2; 10, f. 1, 2; 11, f. 1.*

This species was previously reported by me from Glen Cove,* and has been identified in the cretaceous of the West by Lesquereux.†

Locality: Glen Cove.

MAGNOLIA ISBERGIANA Heer. (Pl. 178, f. 4.)

Magnolia Isbergiana Heer, Fl. Foss. Arct. **6**: 91, *pl. 36, f. 3.*

Although our specimen is in a somewhat fragmentary condition, the broad abruptly-curving base would seem to make it referable to the above species, and if so this is the first record of its occurrence in the United States.

Locality: Glen Cove.

MAGNOLIA LONGIPES Newb. mss. (Pl. 178, f. 1, 3.)

These two fragmentary specimens are apparently referable to the species described under the above name by Newberry from the Amboy clays.

Locality: f. 1, Glen Cove; f. 3, Dosoris Island.

MAGNOLIA GLAUCOIDES Newb. mss. (Pl. 175, f. 1, 7.)

Prof. Newberry has described, from the Amboy clays, a new species of *Magnolia* under the above name, which appears to be identical with the specimens here figured. It is unfortunate that the nervation in the Amboy specimens is not well preserved, but the general appearance is so close, and the identity of each with *Magnolia* seems so plain, that their reference to the same species seems imperative. It is evidently closely allied to *M. Boulayana* Lesq. Fl. Dak. Gr. 202, *pl. 60, f. 2.*

Locality: Sea Cliff.

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* Trans. N. Y. Acad. Sci. **12**: 234, *pl. 7, f. 4*; (1893).

† Cret. and Tert. Fl. **72**; Fl. Dak. Gr. **202**, *pl. 60, f. 3, 4.*

MAGNOLIA AURICULATA Newb. mss. (Pl. 179, f. 6, 7.)

Amongst the commonest of the Amboy clay species are certain very variable leaves which Newberry has described under the above name. In typical specimens the base of the leaf is auriculate, as it is in f. 7; in others the base is slightly decurrent, as in f. 6. Close comparison with a large number of specimens seems to warrant the reference.

Locality: Glen Cove.

MAGNOLIA VAN INGENI n. sp. (Pl. 175, f. 6.)

Leaf narrowly oblong, tapering equally to base and apex; margins almost parallel in the middle, entire; length about 4½ in., width about 1⅜ in.; petioled; petiole about 1 in. long; midrib narrow; secondaries fine, irregular, camptodrome near the margin and connected throughout by numerous fine loops and cross reticulations.

Resembles *M. glaucoides*, but is much narrower. Named for Mr. Gilbert Van Ingen, the collector.

Locality: Sea Cliff.

LIRIODENDRON PRIMÆVUM Newb. (Pl. 179, f. 4.)

Liriodendron primævum Newb. Later Extinct Floras, Ann. Lyc. Nat. Hist. N. Y. **9**: 12 (1868); and Illust. Cret. & Tert. Pl. *pl. 6, f. 7.*

This imperfect specimen apparently represents one of the many forms which this species assumes, under which it has received the names of *Leguminosites Marcouanus* Heer, *Phyllites obcordatus* Heer, *Liriodendron Meekii* Heer, etc., from the West and from Greenland.* It has also been found by me on Staten Island† and in the Amboy clays (?).

Locality: Glen Cove.

LIRIODENDRON SIMPLEX Newb. (Pl. 179, f. 9.)

Liriodendron simplex Newb. Bull. Torr. Club, **14**: 6, *pl. 62, f. 2, 3, 4* (1887).

This is apparently the most abundant of all our cretaceous species in America. It is often difficult to separate from the prev-

*See *L. Meekii* and its varieties in Fl. Foss. Arct. **6**: 87–90, *pl. 18, f. 4c; 22, f. 2–13; 23, f. 3–8; 25, f. 5a.; 45, f. 13a, b.*

†Trans. N. Y. Acad. Sci. **11**: *pl. 2, f. 8?* (1892), and **12**: 35, *pl. 3, f. 4* (1892).

ious one. It is common in the Amboy clays, on Staten Island,* Long Island,† Martha's Vineyard,‡ Greenland and in the West. As in the previously described species it may also be identified in some of the forms of *L. Meekii* Heer, and *Sapotacites retusus* Heer, from Greenland,§ and as *Sapotacites Haydeni* Heer and *Phyllites obcordatus* Heer, from the West.‖

Locality: Glen Cove.

LIRIODENDRON OBLONGIFOLIUM Newb. mss. (Pl. 179, f. 3.)

This is apparently a fragment of the species described by Newberry under the above name from the Amboy clays.

Locality: Glen Cove.

PLANT REMAINS OF UNCERTAIN AFFINITIES.

On Plate 180 may be seen a number of fragmentary remains, whose exact botanical affinities it would be very difficult to state.

f. 1. Apparently a winged seed or samara. It is too symmetrical for *Pinus*, but may represent one wing or lobe of the organism described by Newberry under the name *Tricalycites papyraceus*, from the Amboy clays, a specimen of which is figured on this plate and described further on. Or, if it were not for the well-defined nucleus at the base, I should be inclined, perhaps, to consider our specimen as a leaf of some species of *Podozamites* or *Pterophyllum*, such for example as *Pterophyllum* (?) *Haydeni* Lesq. Cret. Fl. 50, *pl. 1, f. 6, 6b.*

Locality: Glen Cove.

f. 4. This is a fragment of some leaf with well defined parallel nervation, and might be referred to some species of *Podozamites*, many of which are found in the Amboy clays.

Locality: Glen Cove.

f. 2, 3, 12. These specimens of parallel nerved leaves were selected from a large number collected. They may be considered as monocotyledones, and could be more or less successfully com-

* Trans. N. Y. Acad. Sci. 11: 98, *pl. 2, f. 2–7, 9* (1892).

† Trans. N. Y. Acad. Sci. 12: 235, *pl. 5, f. 1–5;* and 7, *f. 2, 3* (1893)

‡ Am. Journ. Sci. (III.) 39: 98, *pl. 2, f.* 6, 7 (1890).

§ See previous reference and Fl. Foss. Arct. 7: 32, *pl. 61, f. 10;* 38, *pl. 63, f. 6.*

‖ Illust Cret. and Tert. Pl. *pl. 5, f. 1–3.*

pared with species which have been figured under the genera *Poacites* Brong., *Cyperites* Lindl. and Hutt., *Phragmites* Trin., etc.* I do not think it wise, however, to refer them definitely in their fragmentary condition.

Locality: Glen Cove.

f. 11. This is a fragment of a fruit, composed of round carpels or spores. It has somewhat the appearance of *Caulinites fecundus* Lesq. Tert. Fl. 101, *pl. 14, f. 1–3*, but further than this I would not hazard a conjecture.

Locality: Glen Cove.

f. 9. These two fragments might be provisionally referred to *Typha* and perhaps to *T. latissima*, A. Br. Ettingsh. Foss. Fl. Bilin, 30, *pl. 6, f. 9a, b, 10.*

Locality: Lloyd's Neck.

f. 8. This is evidently an imperfect specimen of the organism described by Newberry from the Amboy clays under the name *Tricalycites papyraceus.* It is a dicotyledone of unknown affinities.

Locality: Lloyd's Neck.

f. 6. Apparently a portion of an ament or catkin of some dicotyledone, probably a *Salix* or a *Populus.* Inasmuch as several species of the former are well recognized in our cretaceous flora, such reference would probably be correct.

Locality: Glen Cove.

Explanation of Plates.

PLATE 174.

Fig. 1. *Sassafras progenitor* Newb. mss. (?) Oak Neck.
Fig. 2. *Colutea primordialis* Heer. Eaton's Neck.
Figs. 3, 7. *Aralia Nassauensis* n. sp. Brooklyn.
Fig. 4. *Aralia patens* Newb. mss. (?) Glen Cove.
Fig. 5. *Salix proteæfolia flexuosa* Lesq. Sea Cliff.
Fig. 6. *Cissites formosus* Heer. (?) Dosoris Island.
Fig. 8. *Grewiopsis viburnifolia* Ward. Lloyd's Neck.

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* *Poacites Mengeanus* Heer, Fl. Foss. Arct. **2**: 466, *pl 55, f. 9, 10a, b.*
Poacites arundinarius Ettingsh. Foss. Fl. Bilin, **24**, *pl. 5, f. 3–5, 16.*
Cyperites deperditus Wat. Pl. Foss. Bass. Paris, 69, *pl. 18, f. 3.*
Cpyerites borealis Heer, Fl. Foss. Arct. **1**: 96, *pl. 45, f. 3, 3b.*
Phragmites Oeningensis Al. Br.; Heer in Fl. Foss. Arct. **1**: 96, *pl. 3, f. 6–8*; and *45, f. 6*, etc.

Fig. 9. *Salix purpuroides* n. sp. Sea Cliff.
Fig. 10. *Eucalyptus ? nervosa* Newb. mss. (?) Sea Cliff.

PLATE 175.

Figs. 1, 7. *Magnolia glaucoides* Newb. mss. Sea Cliff.
Figs. 2, 5. *Andromeda Parlatorii* Heer. Sea Cliff.
Fig. 3. *Juglans crassipes* Heer. Brooklyn.
Fig. 4. *Ficus protogæa* Heer. (?) Glen Cove.
Fig. 6. *Magnolia Van Ingeni* n. sp. Sea Cliff.

PLATE 176.

Fig. 1. *Aralia transversinervia* Sap. et Mar. Oak Neck.
Figs. 2, 5. *Ficus Willisiana* n. sp. f. 2, Glen Cove; f. 5, Sea Cliff.
Figs. 3, 6. *Laurus Omalii* Sap. et Mar. f. 3, Sea Cliff; f. 6, Glen Cove.
Fig. 4. *Hymenæa Dakotana* Lesq. (?) Sea Cliff.

PLATE 177.

Fig. 1. *Protæoides daphnogenoides* Heer. Sea Cliff.
Fig. 2. *Myrsine elongata* Newb. mss. Lloyd's Neck.
Figs. 3, 4. *Celastrophyllum Benedeni* Sap. et Mar. Glen Cove.
Figs. 5, 8, 12. *Paliurus integrifolius* n. sp. f. 5, Lloyd's Neck; f. 8, Glen Cove; f. 12, Oak Neck.
Fig. 6. *Rhamnus* (?) *acuta* Heer. Lloyd's Neck.
Fig. 7. *Viburnum integrifolium* Newb. mss. Glen Cove.
Figs. 9, 10. *Zizyphus elegans* n. sp. Glen Cove.
Fig. 11. *Myrtophyllum* (*Eucalyptus ?*) *Geinitzi* Heer. Glen Cove.
Fig. 13. *Leguminosites constrictus* Lesq. (?) Oak Neck.
Fig. 14. *Leguminosites convolutus* Lesq. (?) Glen Cove.

PLATE 178.

Figs. 1, 3. *Magnolia longipes* Newb. mss. f. 1, Glen Cove; f. 3, Dosoris Island.
Fig. 2. *Juglans arctica* Heer. (?) Glen Cove,
Fig. 4. *Magnolia Isbergiana* Heer. Glen Cove.
Fig. 5. *Magnolia speciosa* Heer. Glen Cove.

PLATE 179.

Fig. 1. *Celastrophyllum decurrens* Lesq. (?) Glen Cove.
Fig. 2. *Diospyros rotundifolia* Lesq. Glen Cove.
Fig. 3. *Liriodendron oblongifolium* Newb. mss. Glen Cove.
Fig. 4. *Liriodendron primævum* Newb. Glen Cove.
Fig. 5. *Laurus Newberryana* n. sp. Glen Cove.
Figs. 6, 7. *Magnolia auriculata* Newb. mss. Glen Cove.
Fig. 8. *Sapindus Morrisoni* Lesq. Glen Cove.
Fig. 9. *Liriodendron simplex* Newb. Glen Cove.

PLATE 180.

Fig. 1. Winged seed ? Glen Cove.
Figs. 2, 12. *Poacites ?* Glen Cove.
Fig. 3. *Cyperites ?* Glen Cove.

Fig. 4. *Podozamites ?* Glen Cove.
Figs. 5, 7. *Cinnamomum Sezannense* Wat. f. 5, Glen Cove; f. 7, Sea Cliff.
Fig. 6. Catkin of *Salix ?* Glen Cove.
Fig. 8. *Tricalycites papyraceus* Newb. mss. Lloyd's Neck.
Fig. 9. *Typha ?* Lloyd's Neck.
Fig. 10. *Menispermites Brysoniana* n. sp. Glen Cove.
Fig. 11. Fruit. Glen Cove.
Fig. 13. *Zizyphus Lewisiana* n. sp. Oak Neck.

Contributions to American Bryology, V.

By Elizabeth G. Britton.

NOTES ON THE NORTH AMERICAN SPECIES OF WEISSIA (ULOTA).

Weissia curvifolia (Wahl.) Lindb.

Orthotrichum curvifolium Wahl. Fl. Lapp. 365 (1812).

Ulota curvifolia Brid. Bryol. Univ. **1**: 302 (1826).

Ulota Americana Mitt. Journ. Linn. Soc. **8**: 26 (1865).

Ulota Americana, Mitt. was described from specimens collected by Drummond and distributed as No. 153, labeled *Orthotrichum crispum*, Hedw. The habitat is given as "On trees in Upper Canada; and upon rocks called Hell's Gates, below Norway House." As the label indicates, the specimens are mixed; and Mitten states that in his set *U. Bruchii*, not *U. crispa*, was distributed. In our set there are two distinct patches, the one on the right evidently grew on trees, for it contains *U. crispa* and *Orthotrichum speciosum*. The other piece grew on rocks. At first sight, from its darker color, and less curly leaves, it would seem to be *U. Hutchinsiæ*, and it is with this species that Venturi compared it in the Revue Bryologique (1892), as it was part of this specimen that I sent to him at that time. He says that "the character which distinguishes it from *U. Hutchinsiæ* is in leaves which are not erect appressed, but distinctly curved as in the leaves of *U. curvifolia*." Now it is with the latter species that the comparison should have been made, and I think that Dr. Venturi would have come to the same conclusion that I have, that they are the same species.

I have compared our specimens with the description of *U. curvifolia* given by Limpricht in the Laumboose p. 28, and find only one discrepancy, he says the cilia have only one row of cells, ours have two. Schimper figures *U. curvifolia* in the Bryologia Europæa with two, and the Manual states they have two. I have also compared the leaves with those of *U. curvifolia*, from Rabenhorst's Bryotheca Europæa, Nos. 182 and 222, and with our specimens they are identical. In this connection it will be remembered that the Manual says that *U. curvifolia* has been collected by Drummond in North America, credited by Schimper. I sent to Kew to ask if Schimper's specimens were numbered, but they are not. In one of Drummond's sets at Kew, however, there is the same mixture of specimens as in our No. 153.

I have appealed to Mr. Mitten twice to reconsider this question, and sent him a portion of our specimen of Drummond's No. 153, but he has not done so. Therefore we must reason the question out for ourselves. Mitten says in his original description that *U. Americana* "differs from *U. curvifolia*, Wahl., in the areolation of the base of the leaf and from *U. crispa* and *U. crispula* in the same particular, as well as in the form of the base of the leaves." Now evidently the first comparison was with the species to which he considered it most closely allied, the second with the species with which the specimens were mixed and confused in distribution. It is to the latter group, however, that Lesquereux and James in the Manual referred it, as in their set they had only a tree species, allied to *U. crispa*.

Macoun's set also has only *U. crispa*. Of course it is possible that Mitten did find a different species mixed in his 153, from the ones which I have found in our set and Hooker's set at Kew, but it will be remembered that it has not been collected since. Whereas *U. curvifolia* has been collected on the shore of Lake Huron by Macoun, and one of the localities given by Mitten for *U. Americana*, is Lake Huron collected by Todd.

The original description reads as follows:

"*Ulota Americana*, Monoica, foliis siccitate tortis appressis e basi subovali longe lanceolatis sensim acutis nervo carinatis marginibus recurvis, saepe suberosis, cellulis basi ad margines seriebus circiter hyalinis oblongis, in media angustis luteis, e superioribus rotundatis diametro circiter $\frac{1}{4000}$ unciae metientibus perichaetiali-

bus apice latioribus obtusiusculis, theca elliptica plicata, operculo conico acuminato, peristomio dentibus bigeminatis 8, ciliis aequilongis angustis 8, calyptra breviter appresse ramentosa."

Now as Venturi says, in the Revue Bryologique, our specimens of 153 agree with this description, and the erose margins of the upper part of the leaves is due to the prominent papillæ. Therefore unless Mitten can prove it to the contrary, I will mantain the synonymy as given above.

Prof. Macoun in his Catalogue says he has "never observed a species of *Ulotâ* that grew indiscriminately on rocks and trees, and therefore proposes to place *U. Americana* at Hell's Gate, and hence a rock species," but he makes the same mistake that Limpricht in his Laubmoose does, and refers to it *U. Hutchinsiæ* as well, citing also Drummond's No. 147, evidently without critically comparing the specimens. Now *U. Hutchinsiæ*, though usually a rock species does occasionally grow on tress, according to Limpricht, l. c., and we have specimens from E. Faxon collected at Brookline, Mass., on trees, as also from A. Commons, near Wilmington, Delaware. Austin collected it on trees near Closter, and last summer I sent to Venturi specimens from the summit of White Top Mountain, Virginia, that grew in dense spruce woods both on rocks and trees, and he pronounced them the same as European *Hutchinsiæ*, though at the time I did not feel satisfied to call them that species.

ULOTA SCABRIDA KINDB. Macoun. Cat. Can. Pl. 6, 83 (1892).

In Macoun's Canadian mosses No. 115 was distributed as *U. Americana*, but later in the Catalogue it was described as a new species, *U. scabrida*, Kindb., on acconnt of its densely papillose leaves. These specimens in our set are very papillose, with erose margins, and they seem to me to agree with Drummond's No. 153, as nearly as young *Ulotas* will agree with older specimens of the same species. Furthermore the specimens agree with Kindberg's description as far as it goes, though I cannot assent to his comparisons, for he seems to me to have said the reverse of what he should have said, when he states that they resemble *U. crispa* more than *U. curvifolia*, and are not much allied to the latter. I

have compared them with specimens of *U. curvifolia*, collected by Breidler, in the Austrian Alps, and with Limpricht's description in his Laubmoose, and *U. scabrida* differs in having a longer, more slender beak to the lid, and the cilia are of two rows of cells, not one as described by Limpricht. Why the comparison with *U. crispa* was made at all I do not understand, seeing the species grew on rocks, and the leaves are not circinnate, unless Macoun has distributed a totally different set of specimens from the ones that were seen by Kindberg. The following measurements and description may enable some other students to determine whether their specimens are the same as in our set.

Leaves "comparatively short as in *U. curvifolia*" (1.5–2.5 mm), "basal cells elongate, alar" (inflated), (5–7 rows of) "marginal distinct and hyaline. Capsule sub-oblong" (less than 1 mm. long) "passing into a long collum" (constricted at neck when dry) "teeth not reflexed, pale" (bigeminate, striolate, perforate, cilia 8, as long as the teeth, of two rows of cells, mouth bordered above the insertion of the peristome, bands of the capsule of four rows of large cells), "calyptra lobate, very hairy" (hairs papillose), "pedicel long" (2 mm., exserted). The parts of the description in brackets are mine. Now Drummond's 153 shows no lid, but in all else they agree with *U. scabrida*. Macoun collected the specimens in the Rocky Mountains near Hector.

It may be that Kindberg in describing *U. scabrida* as a new species different from *U. Americana* Mitt., as it was originally distributed, thought that the latter species was related to *U. crispa*, as the Manual says, but even then I do not understand his comparison.

Weissia Americana (Beauv.) Lindb.

Orthotrichum Americanum Beauv. Prodr. 81 (1805).

Orthotrichum Hutchinsiæ J. E. Smith, Eng. Bot. *t. 2523* (1813).

Orthotrichum strictum Brid. Bryol. Univ. 1: 289 (1826).

Ulota Hutchinsiæ Hammar, Mon. Orth. Suec. 27 (1852).

Weissia Americana Lindb. Musc. Scand. 28 (1879).

Ulota Americana Limpricht; Rab. Kryptfl. 4: Part 2, 21 (1890) not Mitten.

Through the kindness of M. Autran, of the Boissier Herbarium, I have seen the specimens from which Schwægrichen figured *Orthotrichum Americanum*, Beauv., in the Supplement table 138 (1824), and find mounted on the same sheet portions of the type

received from Beauvois. They were collected in Pennsylvania by Muhlenberg, and are identical with the species which we have been calling *U. Hutchinsiæ* in North America.

The confusion which has arisen is in consequence of the use of the same specific name by Mitten for *U. curvifolia* (*U. Americana*, Mitt.) 59 years after it had been used by Palisot de Beauvois for *U. Hutchinsiæ*. With singular fatality it has spread into every modern text-book, catalogue and magazine which has referred to the subject, even to the last report of the American Naturalist of the Proceedings of the Madison meeting, where I am made to say just the opposite of what I did say. Braithwaite in his British mosses is the only one who seems to have understood Lindberg correctly, and he cites *Weissia Americana* (Beauv.) Lindb. for *Ulota Hutchinsiæ*, Smith, and does not refer to *Ulota Americana*, Mitt.

The unfortunate part of it is that Limpricht in the Laubmoose (part 14, page 21, 1890) should have made the mistake of citing Mitten's *Ulota Americana* in connection with this species, and that Venturi in the Revue Bryologique should not have made the comparison of the specimens which I sent him with *U. curvifolia*, and not with *U. Hutchinsiæ*.

WEISSIA AMERICANA RUFESCENS n. var.

Plants more slender, green or brown not black, stems rufous tomentose, leaves less crowded, longer, often 3 cm. narrower, acuminate, upper cells more dense and obscure, lower golden brown, rectangular, not linear or sinuous, marginal shorter, not hyaline; seta 2 mm. long, neck tapering .75 mm. stomata few, small, theca pyriform, 1.5 long by 1 mm. broad, inflated, narrower at the mouth, ridges continuous of 3–6 rows of cells, broadest at the mouth, not prominent on mature capsules; peristome double, teeth reflexed when dry, white granulose, not trabeculate at apex, cilia eight of two rows of cells, fugacious; calyptra with short, glossy papillose hairs.

Summit of White Top, on trees in dense woods of *Picea Mariana* and *rubra*, mixed with *Dicranum longifolium*, *Zygodon viridissimus*, *W. ulophylla* and *Frullania Asa-Grayana*. Alt. 5,678 ft.

Differing in habitat and general aspect from the common form which grows on old stone fences, on erratic boulders and stones in woods forming black patches with *Hedwigia*; from var. *nigritum*,

(Br. & Sch.) Limpr., in the presence of cilia, and its habit of growing on trees in shade.

This is another of the cases so frequent in this genus, where the macroscopic differences are more distinct than the microscopic. We also have specimens collected at Raquette Lake, in the Adirondack Mountains N. Y., which at first sight resemble *W. curvifolia* more than *W. Americana*, but when compared with the normal form of the latter agree in the less papillose leaves, though having the brown color, slender stems and short capsules like the former. The leaves however are not as curved. Prof. Macoun has collected specimens "on trees at Goulay's Point, Lake Superior," which also differ quite markedly from the dense black form with elongated capsules of our Eastern States.

In Sullivant's herbarium there are also duplicates of these specimens labelled "*U. Hutchinsiæ*," with the following note. "Macoun's No. 33 from Goulay's Point, Aug. 5, 1869. Capsule and pedicel not as figured in Br. Eu. Looks like U. Barclayi, Mitt.—See slide.—W. S. S."

WEISSIA COARCTATA (Beauv.) Lindb.

Orthotrichum coarctatum Beauv. Prod. 80 (1805).

Ulota Ludwigii Brid. Mant. 112 (1819).

Lindberg and Braithwaite cite the above synonymy. Limpricht doubts whether it is correct, cites *O. coarctatum* with a ? and says that the plant figured by Schwægrichen (Suppl. I. ii. 26, t. 52) is a different species. He cites this plate under *U. Bruchii*. The original description reads as follows:

Orth. coarctatum; caule suberecto ramoso, ramis inclinatis; foliis linearibus, siccitate crispis, costa integra notâtis; pyxidibus erectis, pyriformibus; orificio striato, coarctato; calyptra pallida, hirta.

J'ai rapporté cette espèce de l'Amérique septentrionale. Elle a quelque rapporte avec *l'Orth. crispum;* mais elle en difère par la forme de l'urne et son orifice strié et rétréci.

It will be noted that the leaves are described as crisped, and that the plants are compared to *O. crispum;* but, on the other hand, the description of the capsules ageees with that of *U. Ludwigii*.

Schimper, in the Bryologia Europea, *t. 227*, figured for *Orthotrichum coarctatum*, Beauv., the species which Bridel (Bryol. Univ.

1 : 794, 1816) described as *Ulota Bruchii*. In the second edition of Schimper's Synopsis Muscorum (p. 301, 1876) he corrected this, and cites *O. coarctatum* Beauv. as a synonym of *U. Ludwigii*, and says that it agrees with the original description but not with Schwægrichan's figures. Under *U. Ludwigii*, he says that *O. coarctatum* (Beauv. et Schwægr.) which he united with *Bruchii* is a distinct species.

The plates in Schwægrichen's Supplement referred to show *U. Ludwigii* as we now understand it, and *t. 52* seems to be quite different. The capsules are quite unlike the previous plate of *Ludwigii*, but they do not seem long enough nor tapering enough to be *U. Bruchii*. It would be hard to say what they were meant for, though they are not *U. Ludwigii*. The locality given is on trunks of trees, communicated by Persoon and Richard from North America, mixed with *O. crispum*. Now *U. Bruchii* has a northerly range, and is rather a rare species. We have it from Canada and Alaska. *U. Ludwigii* and *crispa* are common and range down the Alleghenies to Georgia, frequently growing mixed together. I have sent specimens to the Delessert Herbarium, and asked to have the comparisons made for me; but we learn from M. Briquet, that none of Palisot de Beauvois' mosses are to be found in the Delessert Herbarium, so that we must accept the plate and explanation given by Schewaegrichen, that *O. coarctatum* is the same as *U. Ludwigii*, and that it grew mixed with *U. crispa* and that would account for the description given by Beauvois.

WEISSIA PHYLLANTHA (Brid.) Lindb.

Ulota phyllantha Brid. Mant. 113 (1819).

Weissia phyllantha Lindb. Musc. Scand. 28 (1879).

As no description of the fruit of this species has been published in any American periodical, it seems desirable to give it from the specimens from which it was originally described, supplemented by later observations from better specimens. Mr. Howell, sent two patches, measuring 3 inches across, each of which bore a few capsules, but they were so old and infested by fungi that I had great difficulty in securing a good peristome.

Plants dicœcious, antheridia in superposed buds at intervals of 1 cm. apart; seta 4–5 mm. long, twisted to the right, erect or curved when dry; capsule 1–2 mm. long, ridges 8, of 4–6 rows of cells;

neck long, tapering; stomata abundant at the base of the sporesac, lid conic apiculate; peristome double, teeth recurved when dry, united in pairs, white, granulose-striolate, cilia 8, fugacious, a little shorter than the teeth of two rows of cells; calyptra 2 mm. long, hairs short appressed.

On trees Yaquima Bay, Oregon, Howell, New West Junction, Macoun in fruit.

All the Eastern specimens of this species are sterile, though it has been collected in Mt. Desert, Maine, by Mr. White; in Anticosti and Nova Scotia, by Macoun; Newfoundland, Waghorne. It has also been collected in fruit in Europe, at Killarney, by Schimper, and in the Jæger herbarium there is one specimen collected by Jensen in 1851, in Insula Mona, Denmark, labelled *O. Jutlandicum*, which has seven young capsules, all with long curved pedicels and elongated necks. They grew in a small dense cushion 1 cm. across, but the label does not say whether on rocks or trees. As neither Limpricht nor Braithwaite cite these specimens, it seems worth noting.

WEISSIA MARITIMA (C. M. & K.).

Ulota maritima C. M. & Kindb.; Macoun, Cat. Can. Pl. 6, 84 (1892).

This species is said to differ from *U. phyllantha* in its short oval capsule with a short neck, shorter and thicker pedicel, curved when moist, the leaves long attenuate to the subulate point, distinctly papillose, the vein narrower, rough on back. The habitat also is on rocks, not on trees. The localities are mostly Western, excepting Miquelon, Delamare, and it is also credited to Sweden, but sterile.

We have examined all of Prof. Macoun's suite of specimens of this and *U. phyllantha* and find fruiting specimens of both in his collection. The finest of *U. maritima* are from Cape Breton, and not listed in his catalogue. There is a decided difference macroscopically between the two species. *U. phyllantha* was collected in fruit by Prof. Macoun at New West Junction, B. C., and the capsules are in better condition than those collected by Howell. These were compared with the Cape Breton specimens, presumably collected on rocks, though the label does not say so. Besides the differences noted above, the latter plants are smaller, darker

green or black, not yellow, with stems 5–10 mm. long, leaves 3–4 mm. long, shorter and less circinate when dry, and less papillose on the back of the vein (not more) than *phyllantha*, with the upper cells less distinct and the apex less acuminate. The seta is only 2 mm. long, the neck twisted, not tapering, whereas in *U. phyllantha* the seta is 5 mm. long including the long tapering neck. They are curved in both, perhaps more so in *phyllantha*. The capsules are shorter and more ovoid in *maritima*, but they are mature and full of spores, whereas those of *phyllantha* are old, empty and elongated.

The peristome is reflexed in both, with the cilia erect, but the teeth are longer in *phyllantha*, they are finely granulose and striolate in both, trabeculate at apex in *maritima*, and the cilia are long, carinate, of two rows of cells. The calyptra is brown at apex with long straight hairs.

On the whole, they seem to be distinct enough to separate; if we maintain *crispa* and *crispula* as distinct species, then these are. But the differences in color and size are not constant, for short dark plants have been collected on trees, though we have not seen any tall yellow ones from rocks.

In Jaeger's herbarium there are several specimens from Friesland which resemble *U. maritima* very closely, but they are sterile Those collected in Norway by Lorentz also are small and dark, and grew on rocks.

One of the synonyms given by Braithwaite for *U. phyllantha* may antedate *U. maritima* Kindb. He cites *Gymnostomum viridissimum* Davies, from Wales but without habitat.

WEISSIA ULOPHYLLA Ehrh. Beitr. 1: 191 (1787).

Ulota connectens Kindb.; Macoun, Cat. Can. Pl. 6, 85 (1892).

Ulota camptopoda Kindb.; Macoun, Cat. 75 (1892), fide Macoun.*

It will be noted that the description in the catalogue of *U. connectens* is mainly of the leaves, and all it says of the capsules is

* In a letter dated January 3, 1894, Professor Macoun states that "Kindberg unites *Ulota camptopoda* and *connectens*, and I believe makes them both *Orthotrichum*."

that they are " dark brown, short, subovoid, not contracted at the mouth, costate, pedicel short, scarcely emergent. Calyptra densely hairy."

Prof. Macoun has sent us all his specimens of this species, and we also have examined his Canadian mosses No. 557.

We are amazed to find that these are simply old plants of what we have been calling *U. crispa*, gathered in the autumn, with the old brown shrivelled capsules buried in the leaves, and pushed aside by the younger innovations, which bear at their summits the young and hairy calyptras of the next generation, just emerging. The capsules including the seta and vaginule measure 4 mm. and have the long tapering neck of this species, the peristome remains in fragments, and the ridges are prominent, of 4–5 rows of brown cells, with the spaces between them contracted and thin. We have compared the leaves also, and they agree. Furthermore we have specimens from various collectors and localities, in precisely this same stage of development, notably those collected on rocks! near Madison, Wisconsin, by Messrs. True and Cheney. (Date not given).

Ulota camptopoda Kindb.; Macoun, Cat. 6, 85 (1892) Canadian mosses, No. 582.

We have seen the specimens cited above, and compared them with the description. The capsules are either too old or too young for satisfactory determination, but even on the old capsules we have seen cilia; the description says there are none! The comparisons with *U. maritima* and *U. Ludwigii* after the description are wild ones. It has no specific relation to either! Its alliance is clearly with *U. crispa*, and it is to this species or *U. crispula* that it should be referred, but there are no capsules matured.

Weissia megalospora (Vent).

Ulota megalospora Vent. Bot. Centr. **44**: 389 (1890) Hedwigia, **32**: 269 (1893).

Dr. Venturi says that this is perhaps one of the most interesting mosses in Roll's collection. It has a cladogenous fruit as in *Ulota Drummondii* and *U. Ludwigii*, but it corresponds to the group of *U. crispa*, and *U. Bruchii* in the crisped leaves; it is re-

markable for its large spores, which are warty and reach the dimensions of *Encalypta*, .055–.061 mm., and the leaves end in a single cuspidate cell. The plant grew with other large species of *Orthotrichum* on the bark of trees and very little of it was collected.

Dr. Venturi has generously shared a portion of it with us; unfortunately this portion does not include a capsule, but from the description and leaves we have been able to determine that it is very nearly allied to *U. subulata* and *U. subulifolia* CM. & Kindb. We have not seen specimens of *U. subulata*, but we should not be surprised to find that these three species were one. Unfortunately Kindberg has no idea of the use of measures in descriptions, and never seems to look at the spores, but his description of *U. subulata*, as far as it goes, agrees with *U. megalospora*, which has precedence by two years.

ULOTA SUBULIFOLIA C. M. & Kindb.; Macoun, Cat. 6, 82 (1892).

The description of this species is most unsatisfactory, being only a comparative one, as follows:

"Liffers from *U. subulata* in the stem being more branched, the leaves when dry twisted or subcrisped, sparingly papillose, revolute at the basal margin at least on one side; the basal cells elongate, alar indistinct; capsule very small, short-obovate, costate, finally subcylindric; pedicel not very long; calyptra nearly naked.

On small trees in thickets, Black's Farm, along the Coquilla river, near New Westminster Junction, B. C., April 26, 1889, Macoun."

We have received from Prof. Macoun fine specimens from this locality, numbered 127, which we have examined and measured. The following are our observations:

Plants small, light yellow; stems slender, creeping and tomentose at base, branches erect, 5–7 mm. high; leaves crisped when dry, spreading when moist, from an erect, ventricose base, 1–2 mm. long, narrowly acuminate, carinate with more or less recurved margins, vein thick ending below the cuspidate apex; cells bluntly papillose, upper rounded, .005–.008 mm.; lower longer, narrower, .013–.027 mm., often brown or yellow.

Autoicous, the antheridia in large, brown buds, with broad bracts. Seta long, slender, including the vaginule to tip of lid, 5–7 mm. Capsule small, 1 mm., when ripe ovoid, becoming elongated when empty, with a long tapering neck, which is twisted when dry; lid apiculate, beak long, .216 mm., bordered with yel-

low; capsules striate, the ridges of 4 rows of cells, yellow and much thickened; teeth united in pairs, reflexed when dry, finely granulose, appearing striolate, smoother and trabeculate at apex, cilia 8, as long as the teeth and smooth; spores brown, warty. .024–.037 mm.

The leaves are very variable in the same plants. The younger ones at the tips of the stems are very long acuminate, the older ones are much broader, sometimes only acute.

We have the same species collected by J. B. Leiberg on *Tsuga Pattoniana*, Traille River Valley, Idaho, received January, 1890, No. 234. Also on *Alnus rubra*, Nooksack River, Whatcom county, Washington, W. N. Suksdorf, July 11, 1890, No. 71.

Club-Root in Common Weeds.

In some instances it has heretofore been somewhat difficult to fully account for the almost perennial presence of Club-root (*Plasmodiophora Brassicæ* Wor.) in various cruciferous crops. Some fields of cabbage and turnip, in particular near New Brunswick, seemed to suggest that some of the cruciferous weeds might harbor the enemy, and with this suspicion in mind, strengthened by the knowledge of the wide range of hosts for the *Plasmodiophora* in the mustard family, Mr. J. A. Kelsey was asked to dig for the slime mould until, if possible, it was found. The lurking pest was not far to seek, and in a short time a hundred roots of the Shepherd's purse (*Bursa Pastoris*), and an equal number of the Hedge-mustard (*Sisymbrium vulgare*) were obtained in the vicinity of the infested cabbage and turnip fields.

Figure 1 shows a group of the *Bursa* roots affected with the *Plasmodiophora*. The roots of this weed are neither large nor fleshy like those of the turnip, and the galls are correspondingly small. Quite frequently the swollen portion is close below the crown, but in some cases the enlargement is midway of the root, and frequently there are smaller galls near the tips of the roots.

In *Sisymbrium* (figure 2) the galls are quite different in outline, being more nearly hemispherical and seemingly situated without any order. There may be three or more of the galls of equal size upon a single root. They are of a darker brown color than in the *Bursa*.

Both kinds of weeds, when badly infested, lose their healthy color, so much so that Mr. Kelsey was able to detect the worst cases of the disease from the dwarfed and sickly appearance of portions of the plant above ground.

Heretofore, so far as the books at hand, Saccardo, Zopf, Woronin, Sorauer, Frank, Eycleshymer, and others, instruct, the hosts

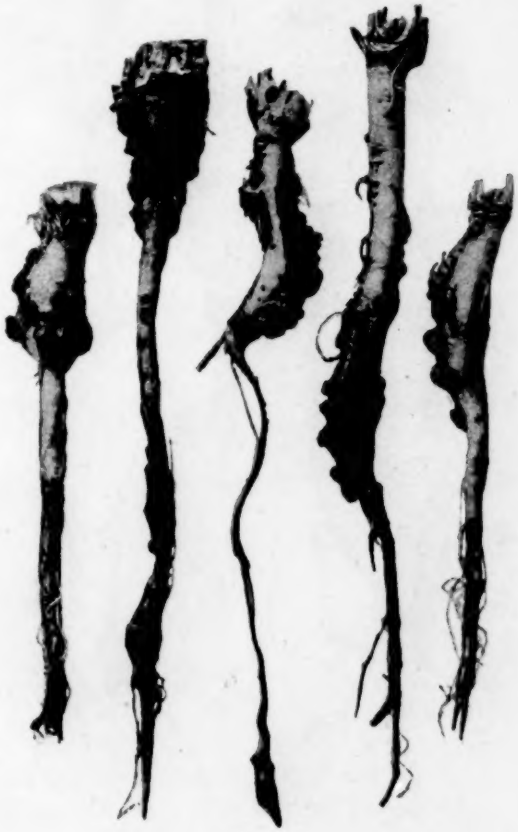

FIG. 1.

which have been definitely recorded are *Brassica oleracea*, with its varieties of cabbage, cauliflower, kale, Brussels sprouts, *Brassica Rapa*, *Raphanus sativus*, *Iberis umbellata* and *Matthiola incana*. It is therefore interesting to add two other genera to the list, and in the manner above intimated, namely, from suspicions that blossomed

with circumstantial evidence and reached full fruition in the discovery.

Of course, the strong, practical bearing of this literal unearthing of truth goes without further saying. The fact that these common

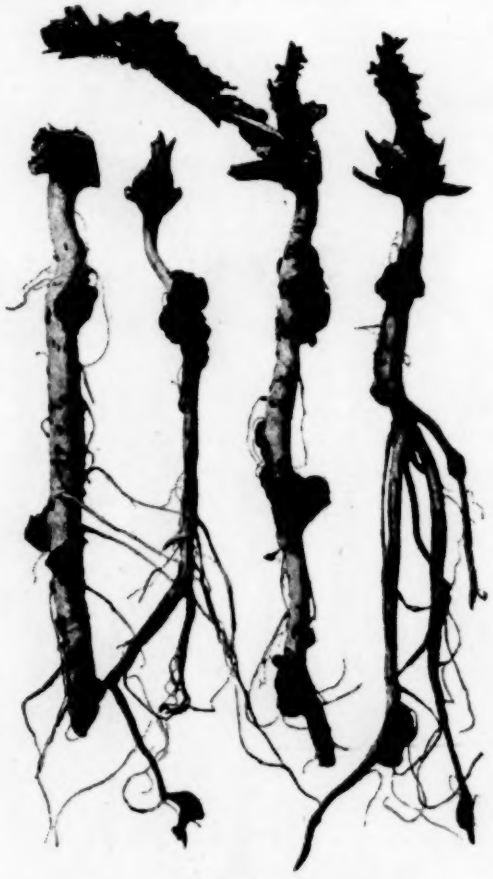

FIG. 2.

weeds are the secret hot-beds of this miserable pest is enough to cause the truck growers to raise the hand of destruction against them. It is likely that the number of species of cruciferous weeds bearing the *Plasmodiophora* can be increased as the search is continued.

BYRON D. HALSTED.

RUTGERS COLLEGE, January 12, 1894.

Potentilla recta L

While visiting in Western New York last summer I came across this plant in Genesee county, about two miles northwest of LeRoy. It was well established along a quiet country road and was quite abundant for a few rods between the roadway and an adjoining wood. It seemed as much at home as *P. Norvegica* and *P. Canadensis*, growing near by. I was told by Mr. E. Huftelen, well-known to florists as a grower of hardy lily-bulbs whose gardens are near by, that he had noticed the plant in this place for about eleven years, and that another locality for it was found a little farther west, near the town of Stafford.

P. recta is in habit more like *P. arguta* than any other Potentilla within its range. But its large flowers with obcordate petals of a pale or sulphur-yellow color, and its symmetrical, digitate leaves, at once indicate something different. The radical and lower stem-leaves are raised on rather long petioles, and nearly all full grown leaves are composed of seven oblanceolate leaflets, whose margins are incisely serrate. The flowers do not last long, the petals being quite fugacious like those of *P. arguta*. But on the whole it is a pretty "weed," and not a bad acquisition to our flora.

Its nearest relative in this country is to be sought in the distant West as *P. gracilis* Dougl., and its varieties. One of these was first described by Nuttall* as *P. recta*(?), who thus doubtfully identified the plant of the Upper Missouri with the European species. This he afterwards changed to *P. rigida*, now *P. gracilis* Dougl. var. *rigida* Watson. *P. gracilis* is a plant of the Rocky Mountain region and of the Pacific slope, extending from New Mexico to the Saskatchewan and Alaska. *P. recta* is indigenous to Middle and Southern Europe, the Caucasus and Western Siberia. It has a place among ornamental plants, but seems to be little cultivated or lightly esteemed, and is not mentioned in such standard works as Nicholson's "Dictionary of Gardening" or Vilmorin-Andrieux's "Fleurs de Pleine Terre." Donne mentions it in the "Hortus Cantabrigensis," and states that it was brought

* Genera i. 310.

to England from Southern Europe in 1648. This doubtless gives the clue to its introduction into this country, where it has found a place in some old gardens, and has sparsely escaped into the fields. When Torrey and Gray published the first volume of the "Flora of North America" (1838–40), they were unable to ascertain its presence in a wild state in this country. Commenting on the similarity of *P. recta* L., and *P. rigida* Nutt., they remark, "Dr. Short has sent us specimens of *P. recta*, which occurs as a weed in his garden, but we do not learn that it is anywhere naturalized in the United States."* Eaton and Wright, who issued their "North American Botany" about the same time (1840), seem to indicate that it was naturalized, for they mention it, and do not separate it from other native species as an "exotic," as is their custom with cultivated plants of foreign origin, so that we may look upon it as gaining a foothold not far from that time.

It is as yet rare and somewhat local, and not of wide range. That usually given is from New England to Northeastern Ohio. It has been most frequently reported from Central and Western New York and the neighboring part of Ontario. Recently (1892) Messrs. Beal and Wheeler have recorded its presence in the southeastern part of Michigan in their "Catalogue of Michigan Plants." It was not given in the previous edition issued in 1881. This is the fathest west where I find mention of it. It is evidently moving westward, and the finding it generally by railroads and roadsides indicates the principal method of advance.

E. J. HILL.

ENGLEWOOD, ILL.

Botanical Notes.

Note on the Herbarium of Stephen Elliott.—It will be of interest to botanists to know that the plants on which Elliott's "Sketch of the Botany of South Carolina and Georgia," published at Charleston, S. C., from 1816 to 1824, is based, are preserved in the museum of the College of Charleston and are readily accessible to students. The collection is unmounted and is tied up in some thirty large volumes. It is in a moderately good state of preser-

* l. c., p. 440.

vation, some portions of it having, unfortunately, been badly damaged by insect depredations. It contains, besides his own collections in the region covered by his book, many specimens from Schweinitz, Rafinesque, Torrey, Oakes and Muhlenberg, and from his colleagues Drs. Baldwin, Macbride and Mr. Gourdin.

The representation of material from Muhlenberg is probably more extensive than in any other collection in America, and this is a most important circumstance, because Muhlenberg's own herbarium, in charge of the American Philosophical Society at Philadelphia, is in very bad order, imperfectly preserved and not very easily consulted. I found that a very large number of the species of Muhlenberg, first published by Willdenow in his "Species Plantarium" and "Enumeratio," are represented by authentic specimens in the Elliott herbarium. Inasmuch as the only other considerable number of them is to be found in Willdenow's herbarium at Berlin, we have here an easy and in most cases satisfactory method of verifying the original descriptions.

The herbarium is in charge of Dr. G. E. Manigault, to whom I am indebted for much courtesy, and who greatly facilitated my studies. N. L. Britton.

Heliotropism of Cassia Marilandica.—Several times during my work in Alabama I had opportunity to note the remarkable heliotropism of *Cassia Marilandica.* The plant is very common in what is known as the black prairie soil of the State. The observations were made on plants one to two feet in height which had not yet produced flower buds. At this time the foliage is very luxuriant, and the lower leaves being quite long and the young ones rather crowded on the stem tend to form a loose and broad rosette. During sunny days this rosette always faces the sun and so strong is the heliotropism that the lower leaves are drawn slightly toward the center, making the rosette much more compact. On cloudy days and during the night the plants are normal, but during the day when the sun is out the rosette is formed and turned so that it faces directly toward the sun, following it through the day. Where the plants are numerous they present a very beautiful and striking picture, especially during the morning and evening hours, when the angle of divergence is strongest because of the low position of the sun. George F. Atkinson.

The Herbarium of the late Dr. C. C. Parry has been purchased by the trustees of the Iowa Agricultural College at Ames, Iowa, as we are informed by Professor L. H. Pammel of that institution. He reports it as containing some 16,000 specimens in excellent condition.

Leucampyx Newberryi A. Gray.—In the Synoptical Flora the genus *Leucampyx* is placed among those genera of the Anthemidæ which have a chaffy receptacle. It is described (in the Key, Vol. 1: Part 2, 78) as having a receptacle "with oblong-lanceolate wholly scarious bracts subtending disk flowers and partly folded round the akenes." This is not an invariable character of the genus, for in specimens of *L. Newberryi* (the only species) received from Dr. T. E. Wilcox and collected near Fort Huachuca, Arizona, the receptacle is in every case quite naked. Dr. Porter writes me that "the chaffs on the receptacle are often few or wanting."

T. H. KEARNEY, JR.

Reviews and Notes on Literature.

Die Delphinium Arten der Vereinigten Staaten von Nord Amerika. E. Huth (Helios; reprint, pamphlet, pp. 15; Berlin, 1892).

Dr. Huth was led to study our North American *Delphiniums* through the examination of certain specimens collected by M. Penard in Colorado, and deposited in the Boissier Herbarium at Geneva. He states that he found great insufficiency in the published descriptions of the species, which is quite true, there having been no systematic treatment of the genus by an American author since the Torrey and Gray "Flora of North America" in 1838, Dr. Gray's paper of 1887* being a collection of notes with a key. Dr. Gray recognized the great difficulty of the systematic presentation of the genus, even with the very abundant material in the principal American herbaria at his command, and one notes throughout his paper an unwillingness to reach conclusions; he recognized 20 species and 5 varieties. Dr. Huth, working on the immensely less material contained in the Berlin and Boissier herbaria, only recognizes 8 species, one of which *D. Penardi*, he proposes as new, and 16

* Botanical Gazette, 12: 49–54.

varieties, one of the latter, *D. exaltatum Barbeyi*, being also proposed as new,* and all the others based on species proposed by various authors, every one of those characterized by Torrey and Gray, Asa Gray and Sereno Watson being thus reduced. Those retained are *D. bicolor* Nutt., *D. cardinale* Hook., *D. decorum* F. and M., *D. recurvatum* Greene, *D. azureum* Michx., *D. Penardi* Huth, *D. exaltatum* Ait and *D. tricorne* Michx., *D. hesperium* A. Gray, he does not feel sufficiently acquainted with to reduce.

N. L. B.

Recherches Experimentales sur la Physiologie, La Morphologie et la Pathologie des Diatomees.—X. Du noyau chez les Diatomees. Miquel, P. (Annales de Micrographie, **5**: 437–462, 3 plates. Oct., 1893).

This is an exceedingly interesting contribution to the subject of Diatomology. Mr. Miquel has discussed very fully the subject of the nucleus of the Diatoms, and we feel that much has been added of importance to this branch of the subject. He speaks of the few researches that have been made upon the protoplasmic contents of the diatoms, as most microscopists have busied themselves with the resolving of the finer sculptured forms. The author's researches have been made upon pure cultures of the plants, and he has devised some methods of technique in the study of the nucleus, which may be of interest. The use of methylene blue is recommended as a protoplasmic stain, both general and to differentiate the various parts. The author maintains that the solution should be very weak; indeed just enough of the coloring matter to tinge the fluid in which the plants are growing. This strength is not enough to kill, and the staining takes place gradually, and there is no distortion. By this reagent the various portions of the protoplasm are differentiated. Methylene blue in water; in water and weak boric acid, and in water with weak ammonia are the three solutions used. In carefully stained specimens the protoplasm is just tinged; some of the chromatic elements acquire a darker blue and sometimes even a violet hue, the nucleus being still darker, sometimes being almost black.

* He has subsequently raised this to specific rank as *D. Barbeyi* (Bull. Herb. Boiss. 1.).

There also some directions for fixing the protoplasm, and the following solution is recommended:

Hydrarg. bi. chlor.	65 gms.
Common salt,	15 gms.
Water to make,	100 c. c.

Specific gravity should be about 1.62.

This solution fixes the protoplasm almost instantaneously, and the coloring methods can then be applied as before. The details of the nucleus are given and figured for *Coscinodiscus concinnus*. In conclusion the author states: "I have said that one could render prominent by the use of methylene blue the chromatine of the nucleus of the diatoms. I recall that this nucleus is always immersed in a special pinnuclear protoplasm, the properties and use of which still remains to be studied; that this protoplasm is always placed in large masses in the centre of the figure of the diatoms; that habitually it forms a bridge, going from one valve to the other; that it is in this protoplasm that one observes the movements of the nucleus, its division or its fragmentation.

S. E. J.

Flore Bryologique du Japon, Nouveux Documents. Emile Bescherelle (Ann. Sci. Nat. (VII.) **17**: 327–393, 1893).

The collections enumerated in this paper were made by the Abbé Faurie on the islands of Nippon and Yezo, and some of Savatier's from the vicinity of Yokohama are included. They supplement the enumeration given by Mitten in 1891, and add many new species to the flora. Many of them bore manuscript names given by Schimper, and as far as possible these have been used, but the larger part of the collections, made by M. Faurie, in 1885–1891, are entirely new and from a hitherto unexplored part of Japan. Considering the similarity of the moss-flora of our Western States with that of Japan, it will be well to make some comparisons of the new species, with the new ones so recently published by Kindberg, and the monographers of the Röll collection. There may be some duplication of names, even here.

E. G. B.

Proceedings of the Club.

TUESDAY EVENING, JANUARY 9TH, 1894.

ANNUAL MEETING.

The President in the chair and eighteen persons present.

Annual reports were submitted by both sections of the Committee on Local Flora, and by the Herbarium Committee.

For the former, Section on Phanerogams, Dr. Britton reported that there was a large amount of material in hand available as a foundation for writing a local flora, and enumerated the principal sources and repositories of such information. Several members expressed approval of the report. The Secretary suggested the advisability of making this flora, when written, descriptive in the fullest sense of the term. There seemed to him no good reason for confining descriptions to leaves, flowers and fruits, omitting such parts—less conspicuous, but not less important—as roots, structure of bark, wood, leaves, etc. It would be impossible to begin such work with a flora covering an extensive region, but it might begin with local floras. Dr. Britton replied that several works which had been very successful had been written on a plan tending in this direction. The President remarked upon the desirability of work of this kind.

For the section on Cryptogams Mrs. Britton reported a large amount of excellent work done by members of the committee as individuals, Dr. Jelliffe's work upon the plants in the Brooklyn water supply being specially noted. The great desirability of a check-list of North American mosses, based on the revised code of nomenclature, was pointed out.

Miss Rogers reported that the Curators were unable to properly care for the Club's collections, and did not feel like greatly multiplying them, because of lack of room and conveniences. For the same reason the herbarium bequeathed by the late Miss McCabe had not been unpacked, arranged, or listed. The preparation of a list of desiderata was awaiting the appearance of the new check-list, which should serve as a basis.

Annual reports were submitted by the Treasurer, Recording and Corresponding Secretaries and Editor; the Curator's report being given above for the Herbarium Committee.

The Treasurer, Mr. Ogden, reported all receipts of the Club as amounting to $1,528.45 and disbursements of $1,509.36.

The Recording Secretary, Dr. Rusby, reported upon meetings, attendance, membership and scientific contributions. The attendance has been about the same as in 1892, 412 total and 27 average, the largest 44 and smallest 17. There had been 2 resignations, 3 dropped for non-payment of dues, 3 active, 1 corresponding and 1 honorary member died, with election of 18 active members, yielding a net gain of 1, and making the total membership at present 165. The number of scientific papers presented was 37, nearly double that of the previous year. Considerably more than half of these had been accepted for publication, and had resulted in contributing to science 4 new genera and 107 new species and varieties.

The Editor, Dr. Britton, reported a greater amount of publication effected than during any preceding year, there being 501 pages and 36 full page plates in Vol. 20 of the BULLETIN. Reference was made to the improved method of making up the Index to Recent Literature relating to American Botany which would be adopted in the January number.

The publications in the MEMOIRS were enumerated as follows:

Vol. 3, No. 2. "The Naiadaceæ of North America," by Dr. Thomas Morong, 65 pages and 54 plates.

Vol. 3, No. 3. "Enumeration of the Plants collected in Bolivia by Miguel Bang," by Dr. H. H. Rusby, 67 pages.

Vol. 4, No. 1. "Index Hepaticarum; Bibliography," by Prof. L. M. Underwood, 91 pages.

Vol. 4, No. 2. "The Botanical Exploration of Virginia," by Mr. John K. Small and Miss Anna Murray Vail, is in press, as is also

Vol. 5, No. 1, consisting of the "Check-list of Plants of Northeastern North America," authorized by the Botanists of the American Association for the Advancement of Science.

It was suggested that the size of the BULLETIN should not be further increased with the subscription price remaining at $2, and the Club's membership fee remaining at $4. Any increase in the

Club's funds would be more wisely devoted to extending the MEMOIRS. It was desirable that several back numbers of the BULLETIN be reprinted, so as to allow of preparing a number of full sets of the volumes.

The Club, upon motion of Dr. Rusby, authorized the Editors to reprint the deficient numbers of the BULLETIN in accordance with the suggestion contained in the report.

Under Election of Officers, Dr. Wheelock moved that the Secretary be instructed to cast an affirmative ballot for the reëlection of all the present officers. The motion was seconded and unanimously adopted.

Upon motion by Dr. Britton, the Secretary was requested to place upon the minutes a suitable entry recognizing the character and worth of the late Justus F. Poggenburg, and his connection with and services to the Club and to the cause of Botany, and to communicate a copy of the same to his family.

The regular paper of the evening was then presented by Dr. Britton, entitled "Notes on the Herbarium of Stephen Elliott." An abstract is printed in this number of the BULLETIN.

Index to Recent Literature Relating to American Botany.

Atkinson, George F. Frost freaks of herbaceous Plants. Bot. Gaz. 19: 40–42. 17 Ja. 1894.

Brief account of frost freaks in *Cunila Mariana* and an unidentified composite.

Craig, Thos. A new *Dictyosphærium*. Proc. Nat. Sci. Assn. S. I. 4: 10. *Illustrated.* 13 Ja. 1894.

Davis, Chas. A. Botanical Problems. Asa Gray Bull. No. 4. 1894.

DeCandolle, Casimir. Three new Species of Mexican Plants. Bot. Gaz. 19: 39–40. 17 Ja. 1894.

Guarea Palmeri Rose, *Trichilia Palmer* C. D.C. and *Trichilia Colimana* C. D.C. collected by Edward Palmer.

Eby, Amelia F. Preliminary List of the Lichens of Lancaster County, Pa. Pamphlet, pp. 5. 29 Ja. 1894.

Farlow, W. G. Notes for Mushroom-eaters II., III. Gard. & For. 7: 43. 31 Ja.; 52. 7 Fb. 1894.

With illustrations of *Agaricus procerus*, *A. campestris* and *A. phalloides*.

Foerste, August F. Botanical Notes from Bainbridge, Georgia. Bot. Gaz. **19**: 33–38. 17 Ja. 1894.

Discusses oaks as weeds; a new compass plant (*Aster concolor*); a rose with green petals; prevalence of fungi; fossil palmettos in Florida.

Fink, B. Blights, Orchids and Ferns. Pamphlet, pp. 12. Fayette, Iowa, Ja. 1894.

Hitchcock, A. S. A hybrid *Baptisia*. Bot. Gaz. **19**: 42. 17 Ja. 1894.

Notes probable hybrid between *B. australis* and *B. leucophæa* in Kansas.

Hooker, J. D. *Erythroxylon Coca*. Curtis' Bot. Mag. **50**: *t. 7334*. Ja. 1894.

Hooker, J. D. *Sobralia xantholeuca*. Curtis' Bot. Mag. **50**: *t. 7332*. Ja. 1894.

A Central American species.

Humphrey, Jas. E. Where Bananas grow. Pop. Sci. Month. **44**: 486–502, *figs. 1–6*. Fb. 1894.

Jenman, G. S. *Asplenium Guildingii* sp. nov. Gard. Chron. **15**: 70. 20 Ja. 1894.

Jenman, G. S. *Trichomanes fruticulosum* sp. nov. Gard. Chron. **15**: 71. 20 Ja. 1894.

Kerr, Walter C. Aerial Roots on *Acer rubrum* L. Proc. Nat. Sci. Assn. S. I. **4**: 11. 13 Ja. 1894.

Kraemer, Henry. The World's Columbian Exposition from a Botanical Standpoint. Amer. Journ. Pharm. Fb. 1894 [reprint, pp. 13].

Langdon, Fanny E. A study of *Epigæa repens*. Asa Gray Bull. No. 4. 1894.

MacDougal, D. T. On the poisonous influence of *Cypripedium spectabile* and *Cypripedium pubescens*. Geol. Nat. Hist. Surv. Minn. Bull. 9, part 1, 32–36, *pl. 3*. 16 Ja. 1894.

MacMillan, Conway. Archenema, Protonema and Metanema. Bot. Gaz. **19**: 19–24. 17 Ja. 1894.

Proposes the term *archenema* for the monomorphic gametophytic structure below the Muscineæ and *metanema* for the secondary stage of the dimorphic gametophytic structure among the Muscineæ.

MacMillan, Conway. On the Occurrence of Sphagnum Atolls in Central Minnesota. Geol. Nat. Hist. Surv. Minn. Bull. 9, part 1, 2–13. 16 Ja. 1894.

Meehan, T. *Trillium grandiflorum*. Meehans' Month. **4**: 17. Fb. 1894.

Munson, T. V. Les Vignes Américaines en Amérique.—I. Rev. Viticulture, 1: 81–84. 13 Ja. 1894.

Oliver, D. *Eremanthus purpurascens* Oliv. Hook. Icon. Plant. 23: *pl. 2282.* Ja. 1894.
A new Brazilian species.

Oliver, D. *Peltanthera floribunda* Benth. Hook. Icon. Plant. 23: *pl. 2298.* Ja. 1894.
A Peruvian species collected by Spruce in 1859.

Oliver, D. *Sipolisia lanuginosa* Glaziou. Hook. Icon. Plant. 23: *pl. 2281.* Ja. 1894.
The description of a new composite genus with one species from Brazil.

Peekholt, Theodor. Brasilianische Nutz-und Heilpflanzen—Musaceen. Pharm. Rundsch. 12: 35. Fb. 1894.

Pieters, A. J. On the Study of Fresh-Water Algæ. Asa. Gray Bull. No. 4. 1894.

Pillsbury, J. H. On the Color Descriptions of Flowers. Bot. Gaz. 19: 15–18. 17 Ja. 1894.
Discusses sources of confusion in determining color in plants. Gives tests of various flowers and foliage as determined by Maxwell discs.

Preinreich, H. *Echinocactus tenuispermus* Link & Otto. Monatssch. Kakteenk. 4: 6. *fig. 20.* Ja. 1894.

Quick, Walter J. Sassafras trees. Science, 22: 6, 1894.
Ecologic and economic notes.

Rothrock, J. T. The American or White Elm. Forest Leaves, 4: 104 Fb. 1894.
Two illustrations of *Ulmus Americana.*

Schneider, Albert. Mutualistic Symbiosis of Algæ and Bacteria, with *Cycas revoluta.* Bot. Gaz. 19: 25–32, *pl. 3–4.* 17 Ja. 1894.
Discusses root tubercles of *Cycas* infested with *Nostoc,* rhizobia and various bacteria.

Schumann, K. *Leuchtenbergia principis* Fish. Hook. Monatssch. Kakteenk. 4: 9, *fig.* 20 Ja. 1894.

Sheldon, E. P. On the Nomenclature of some North American Species of *Astragalus.* Geol. Nat. Hist. Surv. Minn. Bull. 9, part 1, 19–24. 16 Ja. 1894.

Sheldon, E. P. Some Extension of Plant Ranges. Geol. Nat. Hist. Surv. Minn. Bull. 9, part 1, 14–18, *pl. 1–2.* 16 Ja. 1894.
Polygonum rigidulum and *Aster longulus* are described as new.

Smith, John Donnell. Undescribed Plants from Guatemala.—XII. Bot. Gaz. **19**: 1–14, *pl. 1, 2.* 17 Ja. 1894.

Twenty-six species characterized; sixteen belonging to Meliaceæ and Piperaceæ by C. De Candolle. *Ardisia paschalis* n. sp. and *Pinus Donnell-Smithii* Mast. are figured.

Stevens, Thomas S. Late-Blooming Trees. Science, **22**: 12 Ja. 1894.

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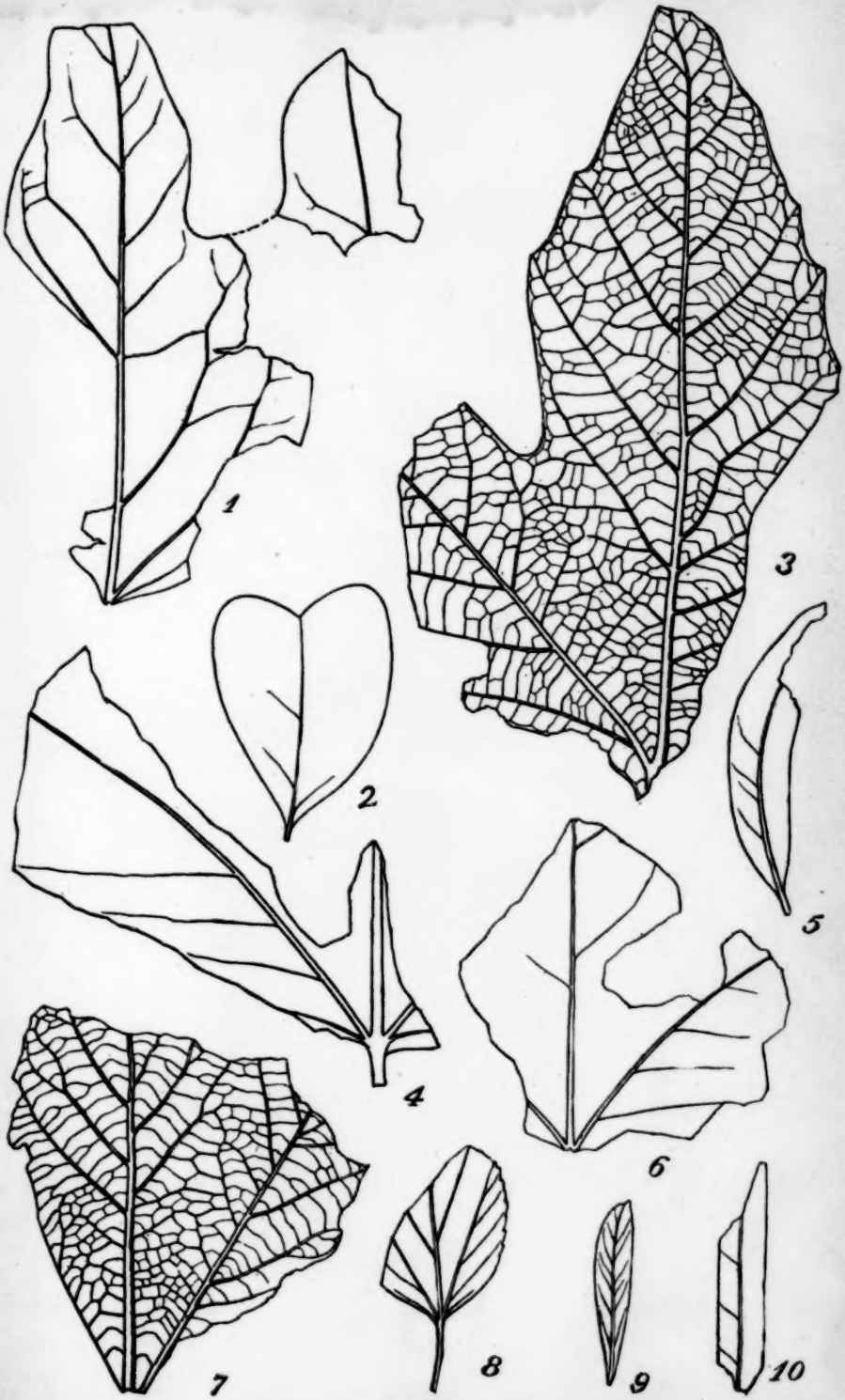

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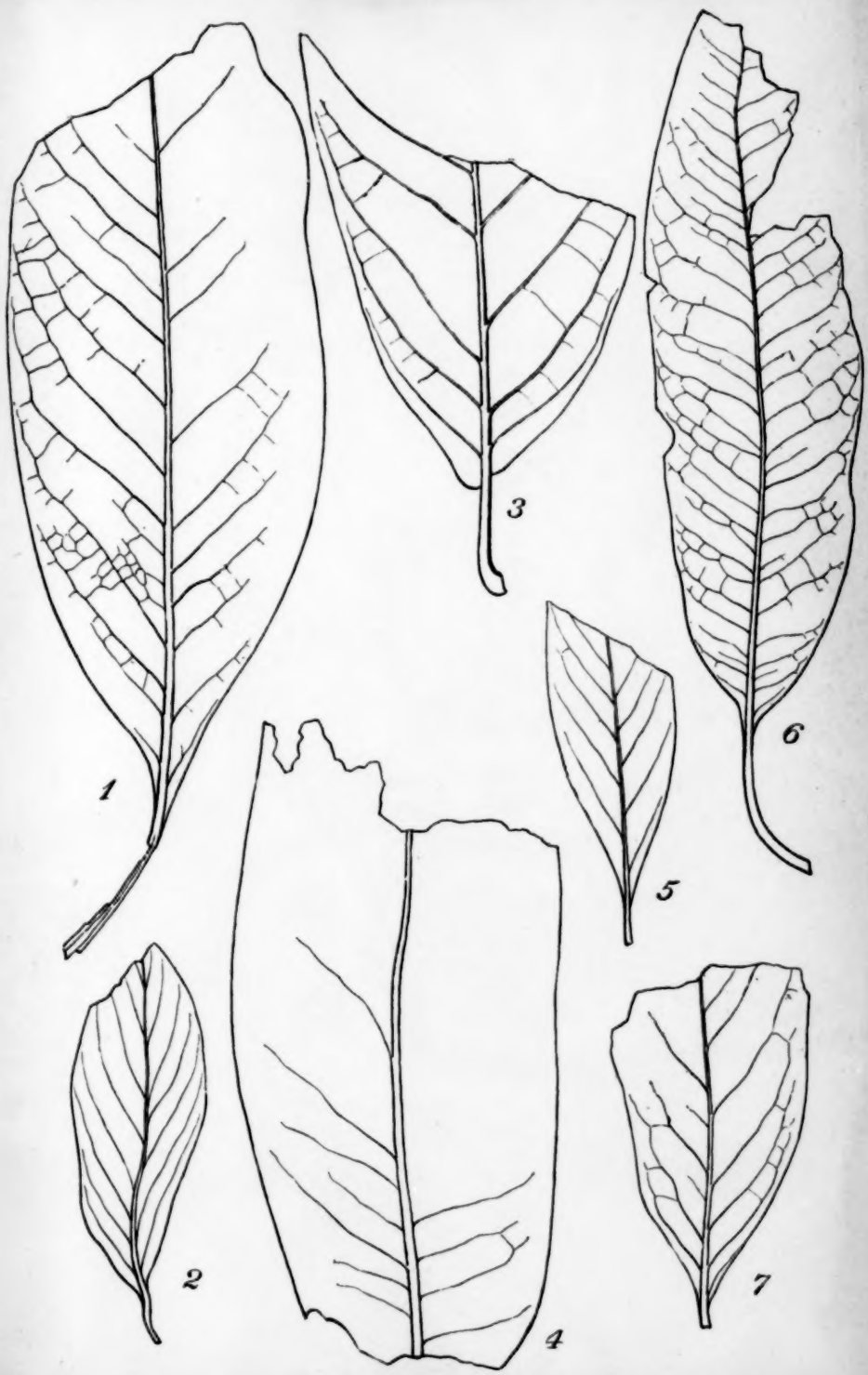

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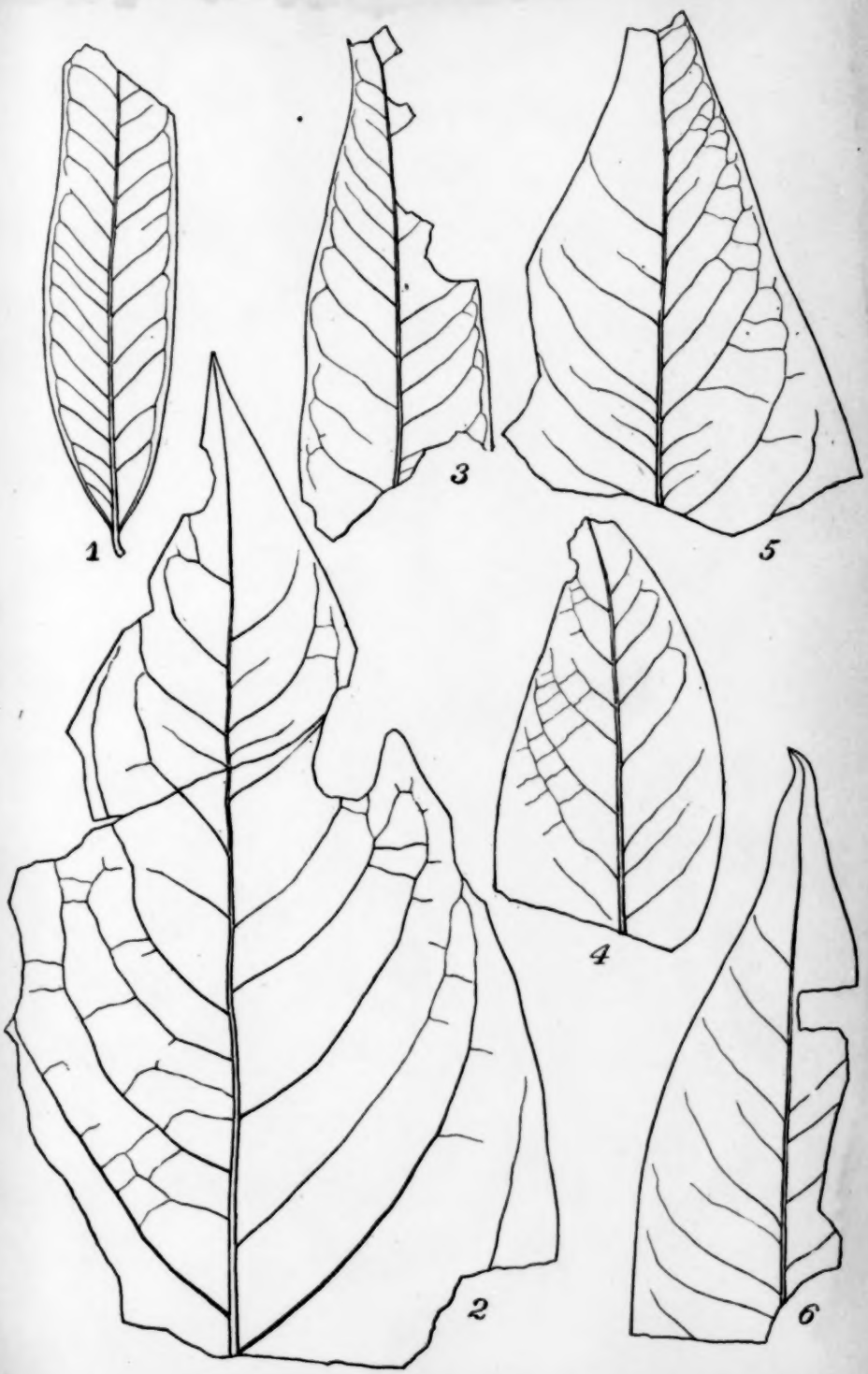

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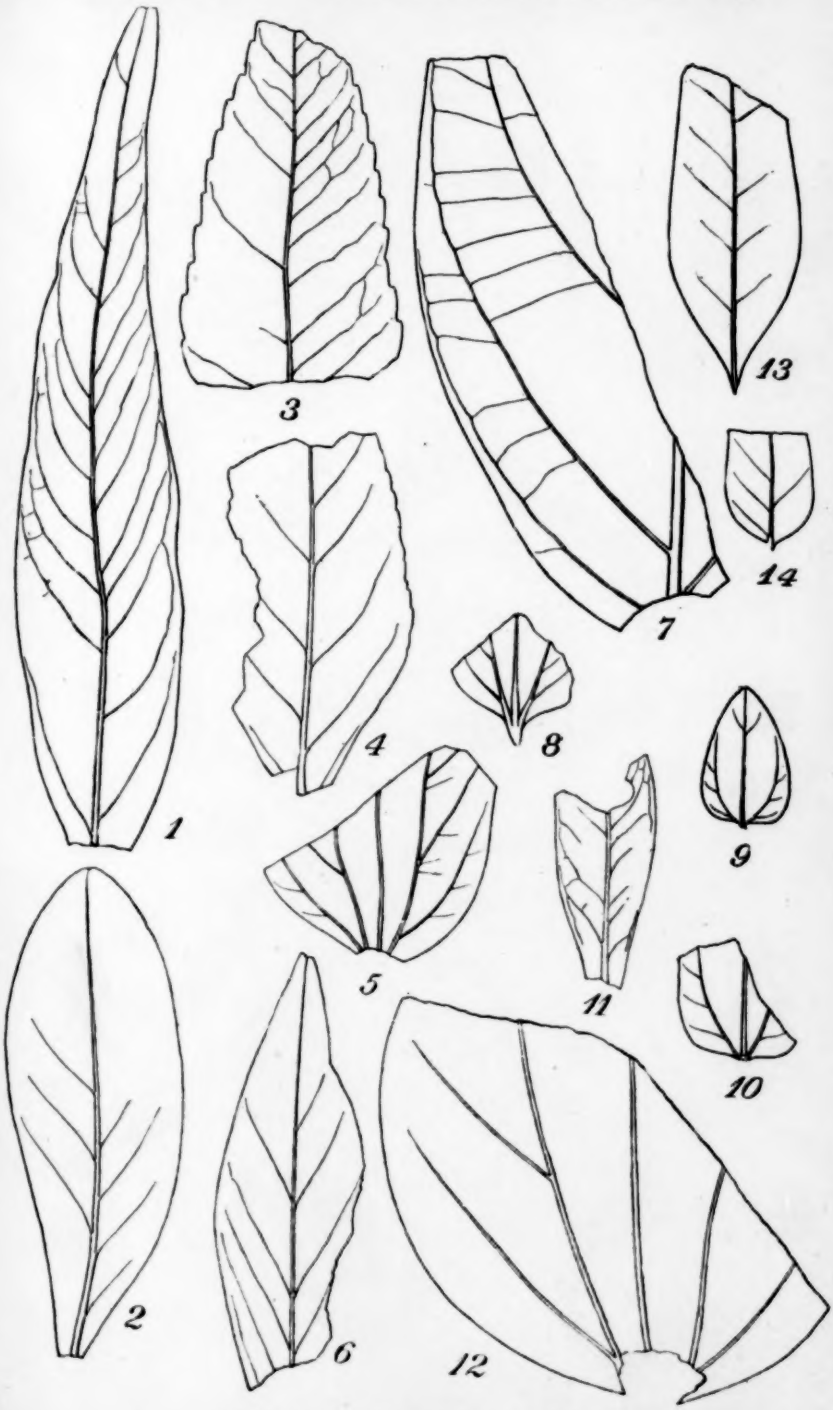

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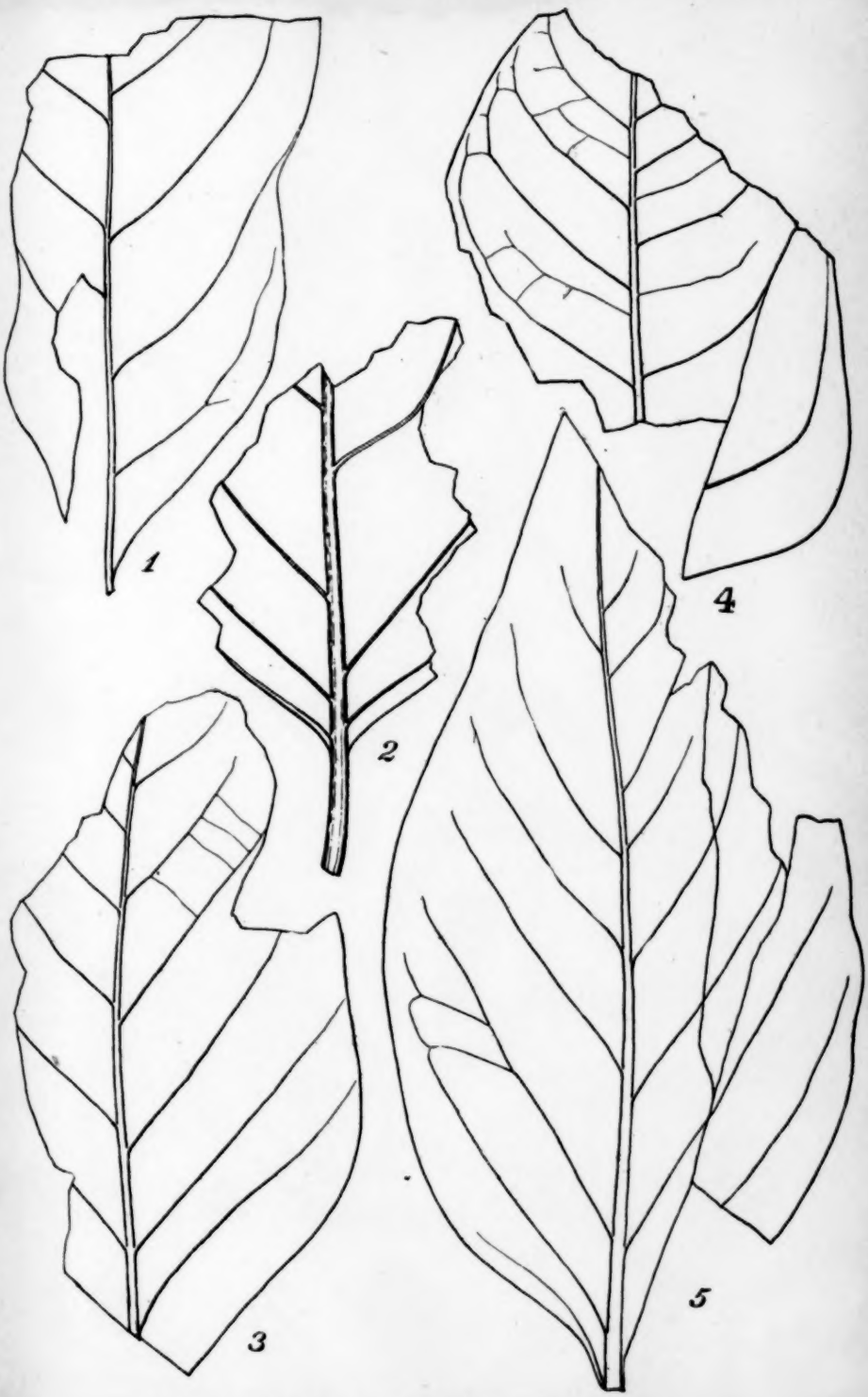

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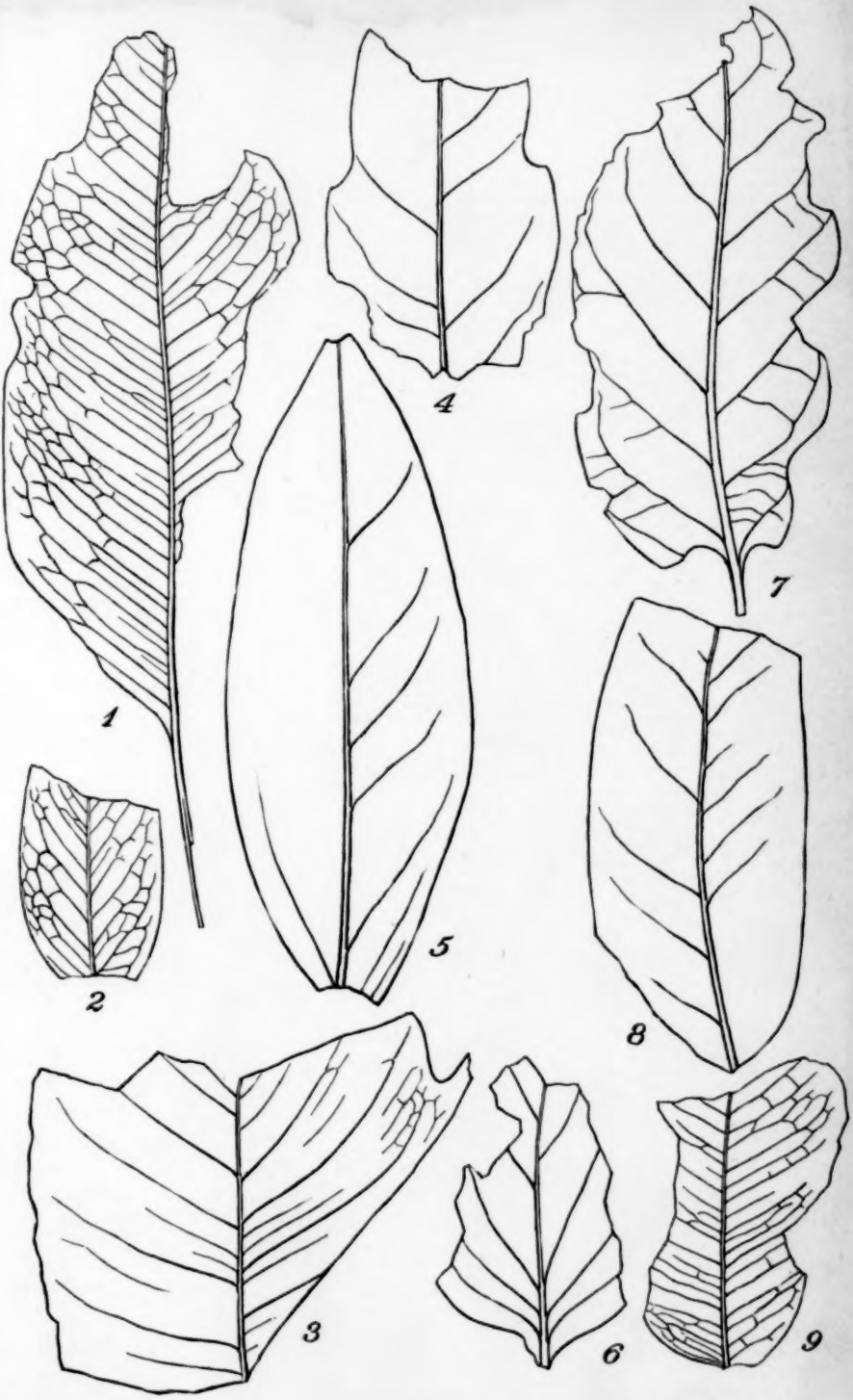

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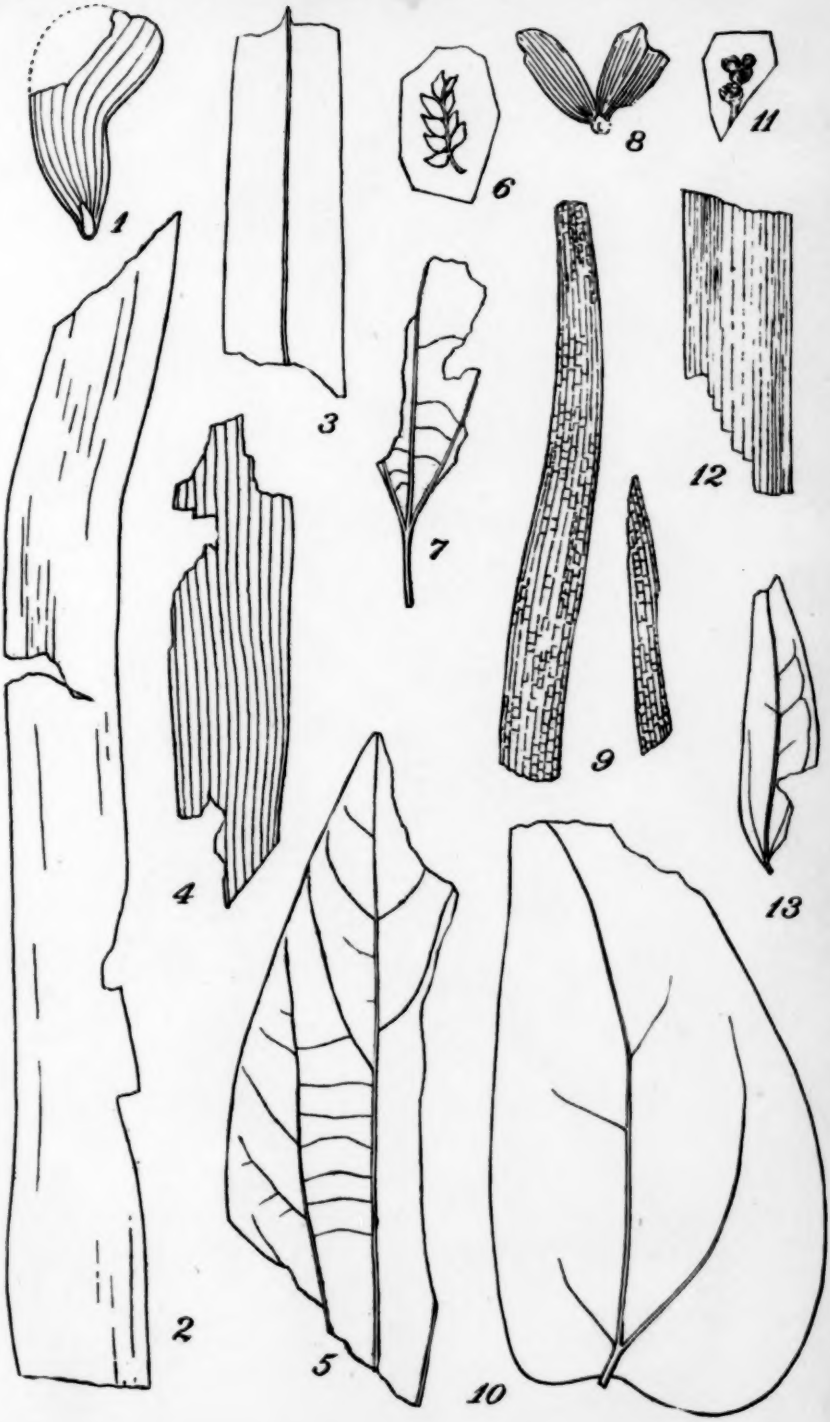

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